The Sidereal Times

IAU XXIIIrd General Assembly - Kyoto 1997

Kyoto IAU 23

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

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Message from the President

The present Assembly is the first to be held in Eastern Asia, and as such it reflects the enormous progress made in astronomy in the region and especially in Japan. With their space missions, the 8-m Subaru optical telescope, millimeter and neutrino facilities, our Japanese colleagues have placed themselves among the first in the world, while the recently launched VLBI space mission "HALCA" represents an absolutely unique instrument for the highest resolution in radio astronomy. In all these facilities many foreign colleagues have been able to participate, and it is this cooperative spirit that makes us so pleased to have this Assembly here in Kyoto, where already in early days high culture included scientific elements.

Astronomy worldwide is booming with new instrumentation becoming available in space and on the ground and

with new discoveries abundant.

We can now study galaxies in the distant regions of the universe and planets in our solar system by direct in situ analysis. But this success story also brings its problems.

Astronomy has become an expensive science, both because of the cost of its instrumentation and because of the number of its practitioners.

Aided by the more utilitarian attitudes in the world, governments everywhere tend to stabilize and in many cases reduce their expenditures for astronomy. While many bright students would wish to enter our field because of its successes, and while many post docs have embarked on a promising but uncertain career, the number of available positions does not increase and in some countries becomes smaller.

How we deal with these problems will determine the future health of our profession. The General Assembly also provides an opportunity to discuss such matters with our colleagues.

This Assembly provides one of the richest menus ever: six Symposia, 23 Joint Discussions, three Invited Discourses and many other meetings. We are much indebted to the Japanese scientific community for having so graciously invited us to hold the General Assembly in the renowned Conference Hall in Kyoto.

Lodewijk Woltjer
President, IAU

What Does the Logo Symbolize?

The logo for the XXIIIrd IAU General Assembly in Kyoto appears not only on our masthead, but on other official publications as well. It was designed by Toshihiro Handa, one of the LOC members.

The logo symbolizes a rising sun, as seen in Kyoto. The red disk is, of course, the sun, which appears on the Japanese flag. It also symbolizes Japan itself, because the Japanese name for our country is 'Nippon,' which means origin of the sun. The horizontal strips across the sun's disk suggest morning dew.

The dynamic image of the sunrise is intended to mirror progress in astronomy, a theme obviously appropriate for an IAU meeting. A red brush strip running across the sun represents the skyline of one of the eastern mountains of Kyoto, for example Higashiyama or Hieizan. The five triangles on the skyline are a silhouette of the 'Goju-no-to,' a five stage tower in a Buddhist temple. They symbolize the city of Kyoto, home to many Buddhist temples.

These triangles also represent scientific excellence.

Such a sunrise scene can be seen from somewhere in Kyoto, although the designer never knows where it is. Will you find the location during your stay in Kyoto?

Toshihiro Handa
LOC

Hints for Enjoying Your Stay in Kyoto

Hello everyone! Welcome to Japan and welcome to the General Assembly of the IAU. We, the LOC, do appreciate the effort you have made to come and join us. Okay, let me stop being quite so formal... You may be exhausted by your long trip to Kyoto. And some unaccustomed features of this historical city may have given you a bit of culture shock. If so, why not relax and try to enjoy the many charms of this city? In what follows, I will list some hints on how to do that.

Let's begin by the services available at the General Assembly venue, the Kyoto International Conference Hall (KICH). The largest advantage of the KICH, especially in this season, is its coolness as well as quietness. In the Main Building, you will find a lot of enticing nooks and crannies within which to chat with your friends or even to contemplate the mysteries of Zen. The second advantage of this locations is the refreshment service at the Event Hall, where you can view hundreds of poster papers and a number of exhibitions at the same time. The refreshments include freshly-brewed coffee, and are freely available at any time from 8:30 to 16:00. Thus, the cheapest (and fastest) way to have lunch is to bring a lunch box with you and fill it with refreshments at the Event Hall or elsewhere. If you are an early bird, you may find some particularly fancy things there.

Next come the social events planned by the LOC. First, the Informal Reception will be held this evening (Aug. 18) at the KICH garden. Don't miss it! Second is the Opening Ceremony on the afternoon of Aug. 20th (Wednesday), which Their Majesties the Emperor and Empress of Japan will attend. After the first session of the General Assembly on the same day, you will enjoy traditional Japanese dances called "Kyomai" (Kyoto-style dance). The coming Sunday (Aug. 24) is the day for taking the Nara tour. Every participant is welcome to join this free tour. We meet at Kintetsu Kyoto station (just next to the JR Kyoto station) that morning. The Japanese music concert will be held in the evening of Aug. 25 (Monday). Unfortunately, all the seats have been sold out. Thus, the best chance (for those without tickets) is to look for a notice from someone who might cancel. Finally comes the banquet (Aug. 27, evening). It is FREE of charge. We hope you will find old friends of yours there.

As for Kyoto itself, many guide books offer detailed information. Also the official travel agent, JTB, will open its desk on the ground floor of the KICH. Therefore, let me add some suggestions based on rather personal preferences of my own:

1) Visit small shrines/temples close to your hotels in the early morning. 2) Drop into a small grocery store to watch (and taste?) some Japanese foods. 3) Go shopping in department stores along Shijo street, for they are quite different from their counterparts in the United States and Europe. 4) Get to Uzumasa Movie Park to enjoy the old Japan in the days of Samurai and Shogun. This costs a few thousand yen, but I think it is much worth the price.

If you are in need of further information, please do not hesitate to drop in to the Information/LOC desk on the ground floor of the Main Building.

Toshio Fukushima
Chairperson, LOC

The First IAU General Assembly in Japan

It is a great pleasure to welcome astronomers to Kyoto. This is only the second General Assembly to be held in Asia, coming a dozen years after one hosted by India in 1985.

This fact may seem somewhat strange. It seems particularly remarkable to me as a Japanese person, given my country's recognized scientific contributions in the fields of theoretical astrophysics, space sciences (including X-ray astronomy), radio astronomy, and so forth.

The explanation, however, can be found in circumstances peculiar to my own country. Japan is a nation remote from most western countries, and expensive to reach. In addition, we are compelled to look for industry donations that amount to more than the government's contribution. These two circumstances have made Japanese astronomers reluctant to host a General Assembly.

On the other hand, the positive effects of a General Assembly are enormous. It encourages young astronomers, in particular. We can become familiar with different subdisciplines. In my case, almost every General Assembly inspired me to extend my research to an inter-subdisciplinary subject. For this reason, I decided to take on the responsibilities of hosting the General Assembly you are now attending.

This has constituted one of my principal tasks as a member of the Science Council of Japan (SCJ) and as the President of the Astronomical Society of Japan (posts which have subsequently been filled by others). This General Assembly is jointly hosted by both organizations. The SCJ falls within the dominion of the Prime Minister's Office, and in this connection I note that this General Assembly has been selected as a scientific meeting at which Their Majesties the Emperor and Empress will be in attendance. Okotoba (the words of welcome) will be given to us by His Majesty the Emperor at the opening ceremony of the General Assembly on the afternoon of Wednesday, the 20th. Please note that you must wear your name badge when entering the conference venue (KICH) as well as its Main Hall, and that we will be using Japanese (with simultaneous translation into English, one of the IAU's official languages) during the ceremony.

More than 1,800 participants have registered for this General Assembly, and more than 1,800 papers (including poster papers) will be presented. This impressive total is largely due to the considerable efforts of Professor Toshio Fukushima, the chairperson of the LOC, who was helped by many young colleagues during the planning for the Assembly. I should also like to express our gratitude to both the companies and the individual astronomers who made contributions towards the Assembly. Thanks to corporate contributions, the LOC grant was possible. Individual contributions allow free participation in the banquet, a new Assembly feature. Regarding the level of cuisine, we think it more important to have a greater number of astronomers than to serve better food in the banquet.

It has been a great privilege for me to work for this Assembly, and I sincerely hope it succeeds in promoting a greater exchange of ideas among different subdisciplines in astronomy. I also hope that all participants will enjoy this meeting and will increase their friendships in the astronomical community. For many of you, this is a different cultural environment. Have you ever noticed that on Japanese maps, it is the Pacific Ocean that occupies the center, while on Western maps, it is the Atlantic Ocean that is central? A different standpoint might give different views and promote new ideas.

Daiichiro Sugimoto
Chairperson, NOC

Announcements

(1) Joint Discussion 4 on "Challenges in Atomic Physics for Cosmic X-ray Spectroscopy" has been canceled.

(2) Special Session (SPS) 3 on "Comet Hale-Bopp" is to be held in the afternoon sessions on Aug. 23 (Sat.).

Welcome to Kyoto

On behalf of the Astronomical Society of Japan, I heartily welcome all participants and guests of the 23rd General Assembly to Kyoto. Kyoto was once the Japanese capital, and could boast that distinction for more than a thousand years. The capital was moved from Nara in 794 to Kyoto, and then transferred to Tokyo in 1868. Consequently, Kyoto has a rich historical heritage and many venerable institutions. Every corner has been colored by cultures from the past.

Since ancient times, astronomy has been one of the most important activities within the imperial palace. A group of astronomical officers called "onmyoshi" observed the sun, moon, and stars for the purpose of timekeeping. They also maintained the calendar and predicted other astronomical phenomena and even human fortunes. The oldest records of astronomical events are found in the historical accounts "Kojiki" and "Nihonshoki". Edited in the Nara era, these contain solar and lunar eclipses as far back as the 6th century. During the Heian era, when Kyoto was the capital, many astronomical descriptions found their way into novels, essays, and diaries. The most famous of these may be the "Meigetsu-ki" (Diary of the Full Moon) written in the 13th century (Kamakura era) by Fujiwara-no-Sadaiye, one of the most famous aristocrats and poets of the time. In his diary, many astronomical events which he either observed himself or found in old records are described, such as supernovae, comets, and meteors. These include the famous supernova that appeared in 1054, and was later identified as the Crab Nebula. The original copy of this diary is now preserved in Kyoto as part of the "Reizei family."

As you see, the Japanese people have long been attracted by astronomical phenomena. But astronomical research as a science was started only about 100 years ago during the Meiji era. Fortunately, progress was rather rapid, particularly after the Second World War. In 1960, a 74-inch telescope was built on the advice of the Science Council of Japan, and it has greatly contributed to astrophysical investigations in Japan. A Schmidt telescope of 1-meter aperture was built in 1974, and a coronagraph was erected on Mt. Norikura in 1950.

Since the first successful launch of the Hakucho satellite in 1979, X-ray satellites have been launched in regular succession every 4 or 5 years. Although they were often relatively small and simple in function, they have placed Japan in the forefront of X-ray astronomy. Neutrinos from the 1987 supernova in the LMC were first detected by the Kamiokande, a neutrino laboratory constructed in a deep, copper mine tunnel. A scaled-up Superkamiokande has started operation.

Radio astronomy, which originally began with solar observations, has evolved to the study of cosmic radio sources at millimeter wavelengths with a 45-meter telescope and a six-element interferometer at the Nobeyama Radio Observatory. Just recently, the first space VLBI mission was successfully begun with the deployment of an 8-meter antenna (HALCA).

In infrared astronomy, the first infrared satellite was launched in 1995, and based on its success, a full size satellite with a 70-cm telescope is under development and intended for launch in 2003. A large (8 meter) optical/infrared telescope is under construction on Mauna Kea in Hawaii, and is eagerly awaited by the Japanese astronomical community. First light is expected in 1998.

In the area of theoretical astronomy, an early interest in celestial mechanics has diversified into the fields of solar and stellar astrophysics, stellar and planetary evolution, and (recently) cosmology. Today, astronomical research in Japan encompasses nearly every branch of this science, and is world class in some. But we have to recognize that fundamental research is still not firmly based. We have only three national universities that have an astronomy department out of about 70 national universities and colleges — less than ten if we include the universities with astrophysical staff in a physics department. In fact, IAU members in our country tally about 380, much less than the 590 of France and the 530 in the U.K., countries whose populations are less than half our own. The budget per GNP spent for basic research is substantially lower, less than half of U.S. and European averages. The fraction of women astronomers in Japan is also quite low. We hope this conference will draw nationwide interest to astronomy, and encourage the politicians to improve this situation.

As mentioned at the beginning, Kyoto is filled with historical sites and institutions; shrines, temples and gardens. You can see many treasures from our past in the museums. Also you can enjoy the old culture that still pervades daily life. If you step into a corner aside the main streets, you can easily find old fashioned houses with a traditional atmosphere. I hope you, and particularly the participants from abroad, will have a chance to visit these things and thereby enjoy your stay in Kyoto beyond the fruitful scientific activities of the conference.

ENJOY YOUR STAY IN KYOTO!

Haruyuki Okuda
President of the Astronomical Society of Japan

Sidereal Times

An Editorial

More frequent than the Olympics, and less frequent than new Italian governments, the IAU General Assembly comes to life once every three years. For two weeks, Kyoto will glow with the incandescence of new research presented at the world's greatest astronomical gathering.

Jun Jugaku

Seth Shostak

A daily newspaper has graced this international exercise for more than six decades, a useful and admirable tradition. We are honored that the organizing committees have nominated us to serve as editors for the ***Sidereal Times***.

Our first task, however, is to ask for help. The rigors of production make it virtually impossible for the editors to attend Assembly sessions. For reports of new research or announcements of general interest, we rely on input from participants. This is your chance to begin an alternative career in journalism, with the added incentive that your first story can be about your own research. We strongly urge you to bring informative items to our attention, and to write short articles on intriguing new results. You will be rewarded with a by-line and modest fame.

In order to encourage you further, photos of the editors are reproduced with this article, thus allowing you to find us more easily. This is a bold move, and one that few editors of major newspapers would dare.

Masahide Takada-Hidai

It is our hope that during the course of this meeting you will turn to the Sidereal Times for announcements, research results, suggestions on what to see in the lovely city of Kyoto, and the occasional, possibly diverting article penned by a bored editor.

Our offices can be found in room 552. Please come, talk to us. You can also leave material for the paper in the appropriate pigeon hole.

Jun Jugaku, Seth Shostak,
Masahide Takada-Hidai
Editors, *Sidereal Times*

IAU Symposium No. 185: New Eyes to See Inside the Sun and Stars

Stellar seismology was born in the early seventies, when it was recognized that the solar "five-minute oscillations" — quasi periodic vertical motions in the solar atmosphere with mean amplitudes ranging from 200 to 2000 m/s — are the evanescent wakes of millions of highly non-radial modes of vibrations that penetrate the interior of the sun coherently. Measurements of the wavelength, amplitude, and phases of these vibrations probe the interior of a star the same way the structure of the earth's crust, or its mineral deposits are sounded with seismic methods.

Within the twenty odd years since the discovery of the seismological relevance of the "five-minute oscillation" stupendous progress has been made in experiment and theory, both qualitatively and quantitatively. This symposium is a comprehensive presentation of the most recent achievements of "Helioseismology" to a broader astronomical community. The organizers have made considerable efforts to invite the leading experts in the field, to present and discuss the large array of results obtained by the GONG people — the Global Oscillations Network Group — , and from other Earth based facilities worldwide, as well as the beautiful data and the astounding inferences made possible with the unique SOHO — Solar Oscillations and Heliospheric Observatory.

More than a full day's worth of oral and poster presentations, fully embedded in the seven sessions program, will be devoted to "Asteroseismology;" a large body of new results have been obtained in an effort to extend the experience and techniques of Helioseismology to individual stars across vast areas of the Hertzsprung-Russell diagram.

This rapidly growing field within the realm of stellar photometry, spectrometry, and polarimetry will be introduced on Thursday late afternoon by Don Kurtz, who will be highlighting the most recent developments. The invited speakers on Thursday morning are J. Christensen-Dalsgaard, J. Clemens, S. Kawaler, J. Matthews, A. Gautschy, and T. Bedding. After an overview on the theoretical aspects of Asteroseismology, white dwarfs and their progenitors, rapidly oscillating Ap stars, and the tantalizing question of whether solar like oscillations have really been detected, will be discussed. In each session, theoretical and observational aspects will be treated in a balanced fashion.

In the afternoon on Thursday, the discussion first turns to delta Scuti stars, and the discovery of g-mode pulsation in gamma Doradus type stars, presented in turn by M. Breger, J. Guzik, and K. Krisciunas, whereas D. Baade reports on the observational evidence of B star pulsation. The theoretical aspect of this phenomenon, and its seismological prospects will then be discussed by W. Dziembowski. A new class of variables, pulsating hot subdwarfs called by the slightly uncomfortable name of EC14026 stars (other suggestions are still acceptable) is introduced by R. Stobie and G. Fontaine.

Whereas the multitude of stellar types now amenable to seismological analysis heralds a new era of physics of the single stars, it is the wealth of detailed knowledge about the whole body of our Sun, and the processes and variations therein, that makes "Helioseismology" an exciting and prospering science. Who would have expected 25 years ago to measure one day the sound speed and the velocity of rotation as function of latitude in the deep interior of the sun; to directly confirm the actual temperature distribution near its energy generating core previously inferred from stellar structure calculations (thereby rejecting astrophysical excuses for the neutrino deficit); or to determine the three dimensional distribution of magnetic fields in the subphotosphere with astro-tomography? The five sessions on Helioseismology illustrate the success on the way to the transparent sun.

In the first two sessions, on Monday afternoon and Tuesday morning, the "Global Structure and Evolution of the Solar and Stellar Interior" will be discussed. In particular, the first two review talks, by T. Brown on "Progress and Puzzles in Helioseismology," and by Y. Elsworth on the "Data Needed to See Inside the Sun and Stars," are intended to provide a broader audience with the topical background to better enjoy the detailed presentations of recent research that follow. F. Hill on "Data Analysis Strategies," and B. Chaboyer on "Internal Rotation, Mixing and the Lithium Abundance" touch on very different, yet central issues of this first session.

The second session focuses on the convection zone of the Sun, and convection in stellar cores, introduced by R. Ulrich and I. Roxburgh. Luminosity changes observed on short time scales connect to the efficiency of energy transport in the presence of convection and magnetic fields. The talks about "Solar Irradience Variation" by C. Froehlich (observations) and H. Spruit (theory) amplify on this topic. Which is the role of sub-arcsec magnetic field structure for the heat storage capacity of the convective envelope?

The next two items on the program, scheduled for Tuesday afternoon and Wednesday morning, are the "Large Scale, and the Small Scale Structure of the Sun." An overview of inversion methods will first be given by M. Thompson, followed by a discussion introduced by S. Vauclair of how solar models can be constrained to agree better with the inversion structure, by including element segregation since the Sun's formation. The remainder of the session on "Large Scale Structure" deals with "Rotation and Large Scale Flows in the Solar Interior," one of the central themes of helioseismological investigations with important implications for our understanding of the solar cycle.

J. Schou is the first speaker.

On Wednesday morning, the attention turns to aspects of the response of the solar envelope to small scale seismic events, "sunquakes" like flares, and turbulent instabilities of the intergranular downdrafts. After a review on "Recent Results in Time-Distance Helioseismology (or 3-d Solar Tomography)," P. Goode will discuss the local excitation of p-mode oscillations. Theoretical results of stochastic excitation of the Sun's multi-voiced chorus, and numerical simulations of excitation and damping of p-modes will be shown by P. Goldreich and by A. Nordlund.

The last session of the Symposium moves the focus of interest up into the solar atmosphere, which has been open before our eyes all the time. Yet, its 3-d structure and dynamics, being so intimately connected to the understanding of "where and how" the outer layers of the solar atmosphere are heated, seem far from fully transparent to the mind. T. Ayres reports on IR-observations that reveal important anomalies of the atmospheric stratification, whereas S. Jefferies and F. Deubner demonstrate recent success in extending the methods of seismic tomography and 3-d wave field analysis to the agitated surface layers of the Sun. In his concluding review of wave simulations, M. Carlsson makes a clear point of the importance of a dynamic picture of our understanding of the chromosphere and the spectral features formed there. Numerous short oral contributions are expected to add pepper to this rich program, and jointly with an impressive array of posters with fresh results, to emphasize the productivity of the competing ground based and space borne instruments. The organizers of this meeting are extremely happy to have K. Chitre recalling for us the highlights of these five days, and distilling the essence of recent progress in Helio- and Asteroseismology in the context of modern astrophysics.

F.-L. Deubner
Chairperson, SOC

IAU Symposium No. 184: The Central Regions of the Galaxy and Galaxies

IAU Symposium 184 will be held during the first week of the General Assembly (Aug. 18 - 22) on topics of The Central Regions of the Galaxy and Galaxies.

The symposium aims at understanding the general characteristics of dynamics and physics of the interstellar matter in the central regions of galaxies. Activities such as inflow and jets, shock waves, and starburst will be discussed in the context of the evolution of galaxies. Other highlights include black holes and related activity, and their implications for galaxy dynamics and evolution will be one of the major topics. Because of their high luminosity and extraordinary nature, the central regions of the Milky Way and many other galaxies have been enthusiastically observed and studied. These regions have always encouraged astronomers to use their newest facilities, both ground based and from space.

However, the objects appear to have been discussed individually based on individual data. Not only the data, but also the interactions between scientists studying the center of the Milky Way and those involved with extragalactic objects appear to have been less than optimal.

In this symposium, we attempt to integrate the existing data, both for the Milky Way and external galaxies, and to obtain a unified view of the central regions of galaxies. Galactic scientists will learn from extragalactic studies, and extragalactic people from the Galactic. Could the detailed knowledge of the Galactic center apply to any galaxy by application of some scaling, or vice versa?

In particular, understanding the central activities in the light of the evolution of galaxies is one of the major purposes of the symposium.

Fortunately, advanced observational facilities and techniques, from space and on the ground, are providing us with a large amount of high-resolution, high-sensitivity data in a very wide range of wavelengths, from radio to infrared, optical and X-rays. Evidence for black holes in many galactic nuclei has accumulated, evidence which should also be understood in the light of the general characteristics of galaxy structure and its evolution.

Detailed simulations of realistic dynamics, gas- and magnetohydrodynamics in the central kiloparsecs to parsec regions, as well as on black-hole scales, are now possible to high accuracy based on these data. The simulation will help us to get insight into the essential physics which controls the phenomena occurring in the galactic centers.

Topics to be covered by the symposium are :

(I) Stellar clusters and star formation in the central regions (Sessions 1 and 2):

The nature and origin of the central bulges and dense star clusters, star formation and bursts, and chemical and dynamical evolution of the stellar components will be discussed.

(II) Nuclear interstellar matter (Sessions 3 - 5):

The bars and interstellar shocks, inflow, outflow and circulation of gas, and magnetohydrodynamical phenomena will be discussed based on observations and simulations. Magnetohydrodynamical and high-energy phenomena will be also discussed.

(III) Central activity and black holes (Sessions 6 and 7):

The existence of massive black holes is now evident in many galaxies. General characteristics and their implication for the dynamics of the environments, such as the bulge and nuclear disks, will be discussed based on the high-resolution data from HST and radio interferometers.

Y. Sofue
Chairperson, SOC

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Read and Write E-mail

You can read and write E-mail with the terminals in the Event Hall. There are 20 terminals (Windows 95) connected to the Internet, available from 8:30-18:00 (Monday-Friday) and 8:30-13:00 (Saturday). You can connect them to a host computer at your home institute through "telnet," and then log in your account to read and write E-mail. The LOC has prepared a one-page English manual explaining how to connect the terminal with your home computer. If you have any problems, please feel free to contact LOC assistants. The LOC would like to ask your understanding for the following. (1) You can occupy a terminal for only 10 MINUTES for one connection when other persons are waiting for your terminal. (2) A printer is not available. (3) Only "telnet" is supported. Please do not use other software. (4) The terminals can display only English and Japanese. (5) There is no service for connecting your own portable computers to the Internet.

LOC

(to be continued)

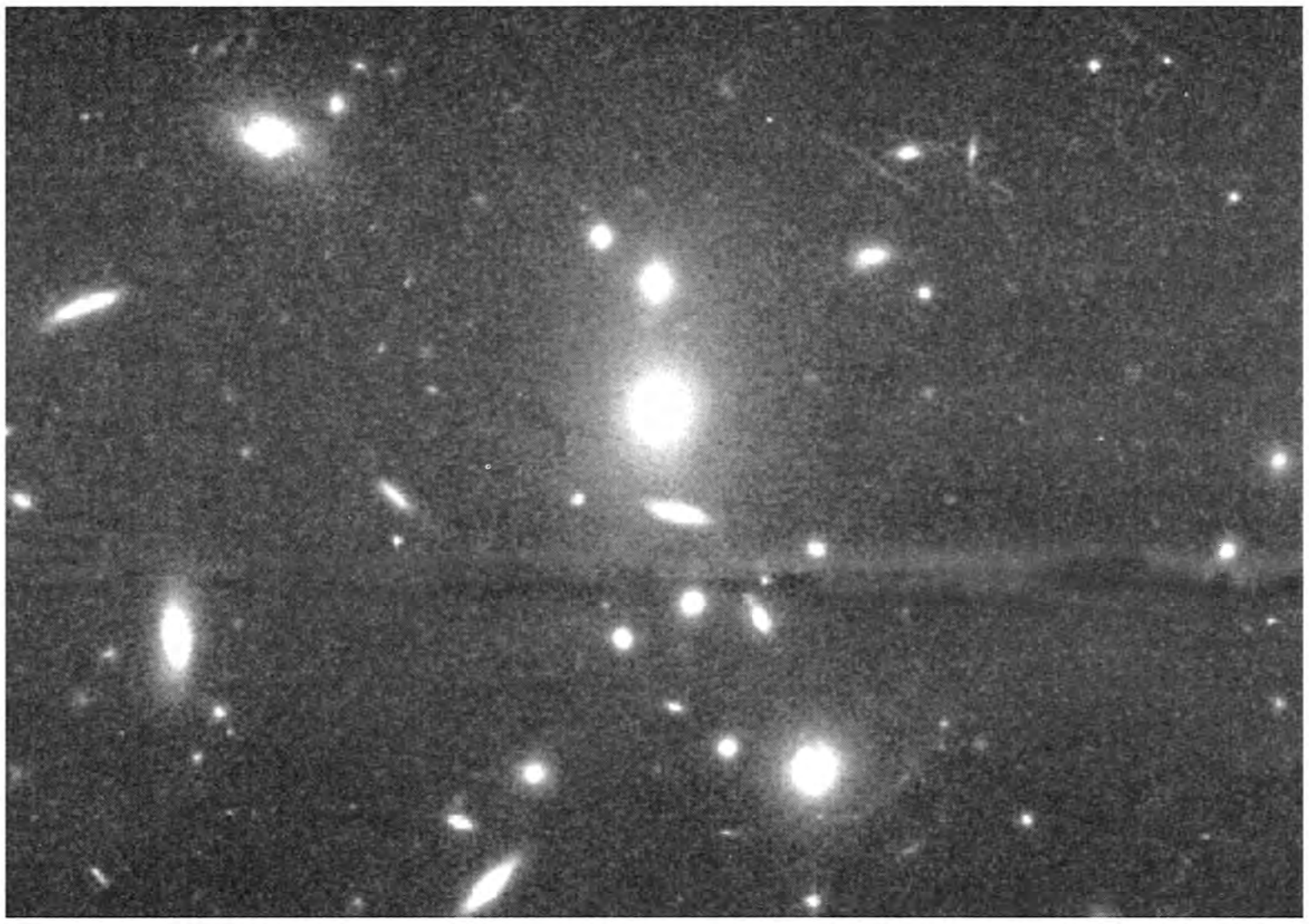
The Sidereal Times

XXIIIrd General Assembly - Kyoto 1997

Kyoto IAU 23

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.2: Tuesday, 19 August



One of the more spectacular new results from the Hubble Space Telescope include this photo of the gravitationally lensed image of PRC97-25, the highest redshift galaxy yet seen. The image was made using Hubble's Wide Field Planetary Camera by M. Franx, of Groningen's Kapteyn Astronomical Institute, and G. Illingworth, of California's Lick Observatory.

The gravitationally-lensed galaxy is the faint luminous arc lying underneath the round galaxy below and to the right of the image center.

Hubble Results Keep Coming

HST is currently in its eighth year of operation, and the two new instruments that were installed during the second servicing mission this past February are now checked out and operational. The HST science program for the second week of August had 53% of the science time devoted to NICMOS observations, while the current week has 43% of the observing time devoted to STIS. Thus, IR imaging and long-slit spectroscopic data are rapidly being disseminated among the groups that have been awarded HST time for Cycle 7.

A thermal short is causing more rapid depletion of the NICMOS cryogen than expected, and therefore implementation of NICMOS programs is being accelerated in order to do as much science as possible with this instrument. The current lifetime of the solid nitrogen cryogen is expected to be roughly 18 months, and during this interval 40-50% of all observations on HST will be made with NICMOS.

An interesting new project, currently being studied at Goddard Space Flight Center, is to develop a cryogenic cooler consisting of a rotating (at 50,000 Hz!) compressor that could possibly be installed in HST and connected to NICMOS on the third servicing mission, now scheduled for December,1999. The effect such a cryo cooler would have in keeping NICMOS at its proper operating temperature, and the consequences for power consumption and the HST thermal environment are being studied. But if all the challenges of such a device can be successfully met in a way that HST science will be advanced, the cryo cooler may be approved to proceed to development and eventual installation, thus prolonging the useful lifetime of NICMOS.

A wide variety of science programs continue to be carried out on HST. During the coming month, second-epoch observations are planned for the gamma-ray burst source GRB 970228 using the STIS CCDs to look for changes in brightness of the associated nebulosity surrounding the source and possible high proper motion of the GRB. Also, WFPC2 imaging of Mars will take place in support of the orbital insertion into Mars' upper atmosphere of the NASA Global Surveyor probe. The NICMOS science team program to image the Hubble Deep Field in the infrared with NICMOS will be carried out very early next year. Recent results that have just been made available from HST observations include a beautiful image by P. James (U. Toledo) et al. of a volcanic eruption on the Galilean satellite Io, captured against the bright background of the planet Jupiter. M. Franx (U. Groningen), G. Illingworth (Lick) and collaborators have also just released an image of the highest redshift galaxy (z=4.9) that has yet been found, in the form of a gravitational arc lensed by an intervening cluster at z=0.4. And, in a collaboration involving joint observations with HST and ESO/La Silla, D. Reimers (U. Hamburg) and colleagues obtained spectra of the quasar HE 2347-4342 below the He II Lyman limit, showing a strikingly different structure than the H I Lyman limit absorption.

These results and other programs carried out with HST will be reported here in Kyoto at the General Assembly and the associated Symposia. It is worth emphasizing that the ability to carry out joint, collaborative observations on both space and ground-based telescopes is of the greatest importance to our science, and is a key reason why astronomy is experiencing significant advances.

ROBERT WILLIAMS
Space Telescope Science Institute

IAU Symposium 183
Cosmological Parameters and Evolution of the Universe

Cosmology has advanced considerably in the recent past, thanks to the observational inputs to extragalactic astronomy. The Hubble Space Telescope, the Keck Telescope, the COBE satellite and numerous other telescopes have contributed to detailed data on the universe. Whereas earlier the subject was considered far too speculative, with very few observational checks, now it has reached a state where the observations are providing considerable constraints on theories.

The Kyoto symposium will take stock of the present situation and will include reviews on observational results, as well as theoretical developments of relevance to cosmology. About 150 participants are expected to attend.

The currently popular Big Bang model, or the standard model, is generally specified by a few parameters: (i) the Hubble constant, (ii) the deceleration parameter, (iii) the density parameter, (iv) the cosmological constant and (v) the temperature of the microwave background. All these will come in for discussion at the Kyoto meeting. There will also be reviews of the detailed studies of how the universe is supposed to have evolved from a very dense hot state to the present diffuse state, and how it was endowed with its presently observed large scale structure.

Thus, there will be presentations on the measurements of the Hubble constant by different groups using different techniques. What is the true value of the Hubble constant? This long-standing question will no doubt receive considerable attention.

How old is the universe? Is there a discrepancy between its age and the ages of stars and galaxies within it? Evidence from stellar and galactic evolution will be presented to address this crucial issue.

In addition to its dependance on the Hubble constant, the theoretical age of the standard model depends upon the density parameter and the cosmological constant. These constants will come in for discussion, as will the observational techniques for determining them or placing limits on their values.

The microwave background will continue to attract attention with data on its small-scale anisotropies. These have a bearing on the cosmological parameters as well as on the growth of structures. A workshop on dark matter and structure formation will discuss the evidence for dark matter and its implications for structure formation theories. It will also look at the observations of discrete sources in this light.

With more and more surveys of relatively far-away objects available, there will be a session on them including the medium deep survey, the mid-infrared deep survey, the X-ray sources, the quasar absorption lines, etc. There will be talks on different redshift surveys of galaxies and QSOs. These will all be looked at in the light of theories of formation and evolution of structure.

Theoretical talks will include structure formation scenarios, the fitting of models with data on large-scale structure, the question as to whether new physics is demanded by the need to explain the data, etc. A second workshop will deal with cosmological models and the astrophysical issues relating to them. Are there bubbly universes? Are massive neutrinos required for cosmology? Is there evidence for explosive events pointing to creation of new matter?

There will be a review of cosmology at the end, essentially on how far the standard model has been successful and what lies ahead. There will also be a talk on alternative ideas that do not accord with the standard model.

The symposium will end with a panel discussion on the strengths and weaknesses of standard cosmology and on the need for alternatives.

Chair: K. Sato, Co-Chair: J.V. Narlikar

Light on Local Customs

"East is east, and west is west, and never the twain shall meet..."

Well, the twain have met, as this first-ever General Assembly in Japan testifies. Nonetheless, if you're not Japanese, you may find occasional aspects of the local lifestyle perplexing. This modest article and its successors are intended to improve your knowledge of Japanese behavior, so that you won't commit a major social blunder at your next cocktail party or banquet. Needless to say, considerations of space limit how much we can do here. You can assure yourself a more comprehensive cultural adjustment by taking a job in a sushi restaurant.

Dining Etiquette

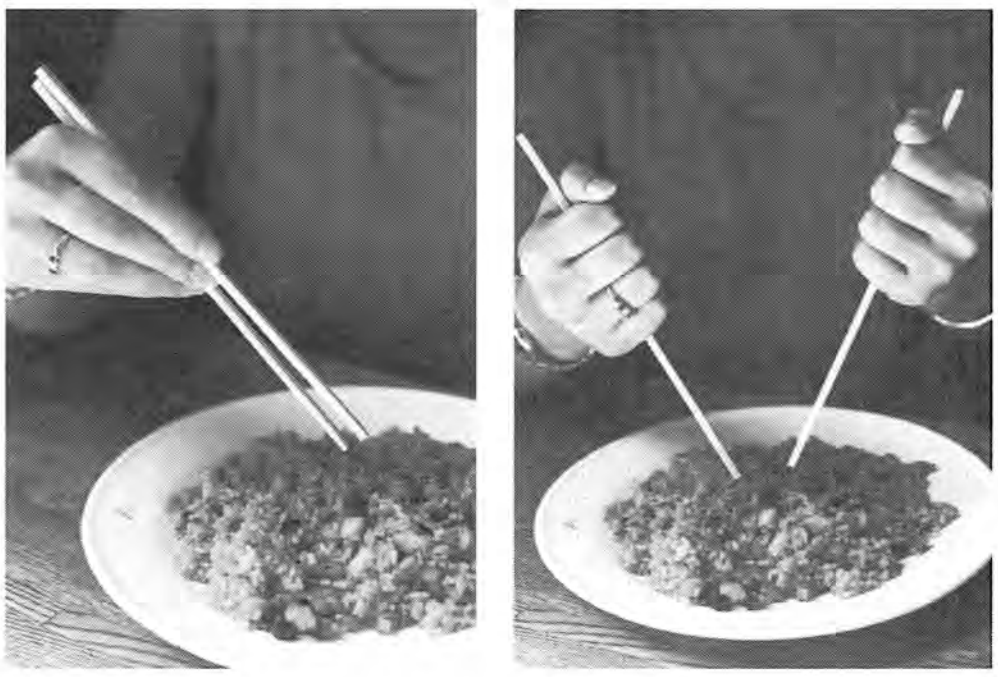
Before diving into your lunchbox, you will frequently be given a moist towel in a sealed, plastic bag. Do not offend other diners by using this to wipe the table or dust off your shoes. It is intended for cleansing the hands and face.

Chopsticks, an idea borrowed from the Chinese, are still used by most Japanese, although the younger generation will occasionally prefer forks, spoons and knives to attack particularly difficult foodstuffs, such as an uncut T-bone steak. The accompanying photos show the right and wrong way to handle chopsticks. Practice using these elegant oriental utensils with a bowl of marbles.

Traditional dining style involves lifting your bowl with the left hand, while using chopsticks in the right to transport the edibles to your mouth. This scheme is so foolproof, the Japanese have little use for napkins. You will often not get one.

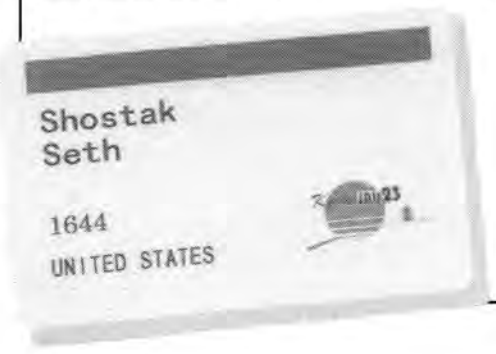
If your ability to read kanji is not yet up to snuff, you may feel intimidated about ordering in a restaurant. One solution to this vexing problem is to dine in one of the many eateries that feature wax models of their meals in a display window. Carefully copy the kanji description of the meal (usually written on a small card next to the model) onto a scrap of paper, and hand it to the waiter. You will be amazed at how well this works.

SETH SHOSTAK



The lefthand photo shows a polite use of chopsticks, as recommended by local gourmands. The two-fisted approach on the right is sure to cause fellow diners to move to the other side of the restaurant.

Spectral Analysis



Have a careful look at your badge. If your name or country is incorrectly spelled, please ask a LOC staff person charged with issuing badges to make you a new one when they are not quite so busy.

You may have noticed the colored bar on the top of badges. How many different colors have you counted? Two or three. Maybe four? In fact, there are a total of seven different badge colors. These are (in order of decreasing temperature) (A) purple, (B) blue, (C) light blue, (D) green, (E) yellow, (F) red, and (G) brown.

The different colors are mapped to seven categories of participants. The categories, are (in alphabetical order) (1) Exhibitor, (2) IAU Exec. Comm., (3) IAU member, (4) Invited participant, (5) LOC staff, (6) Press, and (7) Registered guest.

The obvious question is: Which color corresponds to which category? Sharp-eyed readers can find the answer hidden in this issue of the *Sidereal Times*.

TOSHIO FUKUSHIMA

This wooden building, photographed in downtown Kyoto, is one of the dwindling remnants of the old-style, traditional constructions that once dominated the city.

A Brief History of the Neighborhood

To understand the essence of Japan, some historians have noted its circumstantial similarity to another important island nation, Britain. You may object to this comparison, particularly if you've sampled the cuisine in both countries, but there are nonetheless important geopolitical parallels.

Both Japan and Britain were populated by land-bridge migrations during the last ice age, when sea levels were low, and immigration quotas were high. Both profited from exposure to nearby continental cultures, and yet were spared the constant warfare that might have occurred had they been physically linked to those continents.

Still, there are significant differences. Although Japan is one-and-a-half times as large as Britain, most of that acreage is corrugated mountains and forest. On the remaining, arable land, it houses twice Britain's population. In addition, unlike Britain, Japan has deliberately isolated itself, most notably for two centuries beginning in 1639. In that year, the shogunate legislated commercial barriers intended to keep the growing merchant class down. Japan's traders were cut off from foreign goods. This power play was motivated by a rare period of domestic peace, one that was causing employment problems for the warrior samurai. The ruling class felt that by banning the importation of goods, their social position vis-a-vis the merchants could be maintained. While they were at it, they also imposed some strict rules-to-live-by for the peasants, enjoining them (among other thing) to get up early, and to divorce wives that drank too much tea.

This unstable situation was brought to a close in1853, when the American Commodore Perry sailed his gunboats into Tokyo harbor demanding trade (a move that U.S. automakers would later regret). In 1868, the last shogun threw down his sword, and Emperor Meiji began the modernization of Japan. Meiji also moved the court from Kyoto to Tokyo, dismaying the people of this fair city.

Kyoto

Kyoto was founded by Emperor Kanmu in 794, a few years before Charlemagne's coronation as Holy Roman Emperor. This valley site was chosen by Kanmu because of the natural defenses provided by the surrounding mountains, although the contemporary down side to this is the languid, hot air that collects on summer days. There was also a river to provide water.

For its first four centuries, life in Kyoto was good. The country was at peace, and the ruling class was indolent. But good times at the palace were bought at a price: the rest of the country was only poorly controlled, and ultimately Kyoto's "Golden Age" gave way to internecine battles. There followed plague, famine, and repeated destruction of property by arms and fire. The last is a particular curse, given the Japanese custom of building structures of wood and paper. Indeed, you will virtually never see a shrine or dwelling in Kyoto that is more than 130 years old — the interval since the last, city-wide conflagration. Even the *threat* of fire has been destructive. During the Second World War, the Allies decided against bombing this historic city. But Kyoto didn't know that, and the city fathers bulldozed many thousands of old buildings in an effort to widen streets into effective fire breaks.

One of the motivations for Emperor Kanmu to locate his capital here at the end of the 8th century was the presence of a nearby clan, the Hata, descended from Chinese immigrants. These folk were skilled in weaving, and Kanmu hoped to build an industrious society. He was largely successful: for a thousand years Kyoto was noted for its handicrafts. Since the War, the rise of mass production has shifted economic priorities, and a rush to modernization has changed Kyoto's complexion from wood to concrete. Some lament this change. But on the other hand, wives now feel free to drink tea without limit.

SETH SHOSTAK

[In preparing this article, the author has shamelessly cribbed historical material from several books, the most important of which was "Old Kyoto," by Diane Durston.]

Sidereal Times editor Masahide Takada-Hidai made this photo on Saturday evening. Those of you who arrived early in the weekend may have noted the peculiar pattern of fire on the hills adjoining the city. August 16 is the date of the festival of Daimonji, part of the rites of Bon. The latter celebrates the annual visit of ancestral souls to this world, and Daimonji sends them speedily back to whence they came. The festival is attended by many fire trucks to prevent the outbreak of unwelcome forest fires.

Register Your Homepage!

Put your homepage where it can be found. About 3,200 astronomers and scientists in related disciplines have already registered their WWW (World Wide Web) personal homepages in StarHeads (http://vizier.u-strasbg.fr/starheads.html), one of the StarPages components (http://vizier.u-strasbg.fr/starpages.html) of the Web yellow-page services offered by CDS at France's Strasbourg Astronomical Observatory.

The two other components of this service are:

- the database of organizations, StarWorlds (http://vizier.u-strasbg.fr/starworlds.html) offering more than 4,200 hot links with organizations (plus detailed information on these and on 3,000 additional organizations not yet on the web);
- the dictionary StarBits (http://vizier.u-strasbg.fr/starbits.html) giving more than 110,000 explanations of acronyms and abbreviations.

The StarPages are members of the Star*s Family line of products (http://vizier.u-strasbg.fr/starfamily.html). They offer outstanding features which derive from twenty years of compilation experience. The result is an exhaustive list of entries (including thousands not yet on the WWW), homegeneous coverage of all practical data, a permanent updating and quality checking scheme (including authentication of data originators), and the largest amount of URLs available for a set of astronomy/space resources (currently about 7,500 WWW links in total).

StarHeads is also pointed at by services such as the NASA Astrophysics Data System (ADS) (http://adsabs.harvard.edu/). In other words, when your papers (or abstracts) are listed in ADS, pointers from ADS to StarHeads allow users to find your personal WWW homepage and details about you, your research, and so on.

If you have a homepage that is not yet included in StarHeads, let us have its URL for inclusion. If you do not have a personal web page yet, talk to your local webmaster about setting one up, and give us the URL. Do not forget to mention in your page all practical details for contacting you, as well as information on your activities and interests.

Please note that our services are free of charge and provided to facilitate communication within the astronomical community.

Additional information on the StarPages/Star*s Family products can be obtained from:

Andre Heck, Observatoire Astronomique, 11 rue de l'Universite, F-67000 Strasbourg, FRANCE. Phone: (+33) (0)3 88 15 07 43 Fax: (+33) (0)3 88 49 12 55
E-mail: heck@astro.u-strasbg.fr, hecka@acm.org WWW: http://cdsweb.u-strasbg.fr/~heck

ANDRE HECK

Be a Writer!

The good life awaits. You could be spending your dotage sitting on the beachfront verandah of a Riviera villa, downing cool drinks while your assistant runs to the bank to cash the latest clutch of royalty checks.

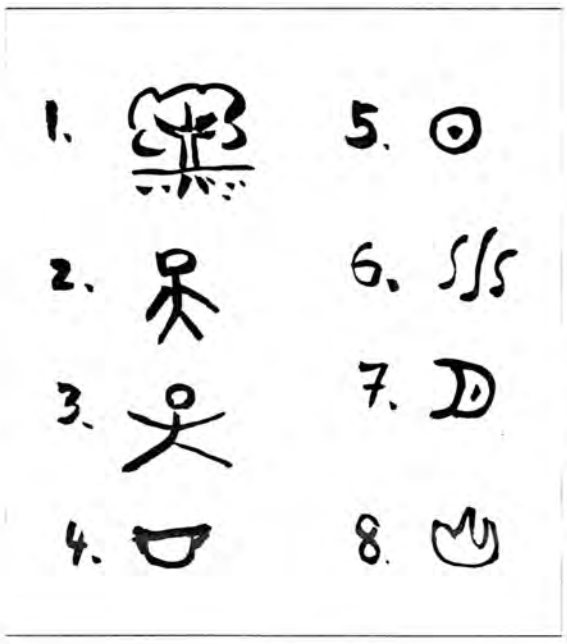
But that won't happen tomorrow unless you establish your literary credentials today. The editors of the "Sidereal TImes" respectfully point out that the contents of this journal are dependent on you. It is impossible for us to cobble together this broadsheet if we attend sessions. So please, scribble two or three hundred words (a single sheet of paper) on your latest research or that of an envied colleague, and bring same to our commodious offices on the fifth floor (room 552). You will soon be travelling in refined literary circles, and be recognized on the street.

THE EDITORS

KANJI: Can you find the answer?

Connect the kanji and corresponding pictographs.

a. 天(sky)
b. 日(sun)
c. 月(moon)
d. 口(mouth)
e. 木(tree)
f. 水(water)
g. 火(fire)
h. 大(large)



Information on the subway

(1) Be aware that there has been a change in subway station names as follows. OIKE has been changed to KARASUMA OIKE.
(2) Your LOC recommends that you may wish to purchase the prepaid ticket cards, both for their convenience (you don't always need change) and the fact that if you buy ¥3000 worth of fares, you get a 10% discount.

Today's weather:
Fair. Occasional rain.
Easterly winds.

Answers
"Spectral Analysis" *(page 2)*
(A)-(2), (B)-(3), (C)-(7), (D)-(4), (E)-(6), (F)-(5), (G)-(1).
"Kanji" *(page 4)*
1-e, 2-a, 3-h, 4-d, 5-b, 6-f, 7-c, 8-g

Acknowledgments

The Local Organizing Committee and the International Astronomical Union gratefully acknowledge the financial and other supports from the following foundations and companies. Without them, the XXIIIrd General Assembly could not have been organized as it is.

Continued from No.1, 18 August

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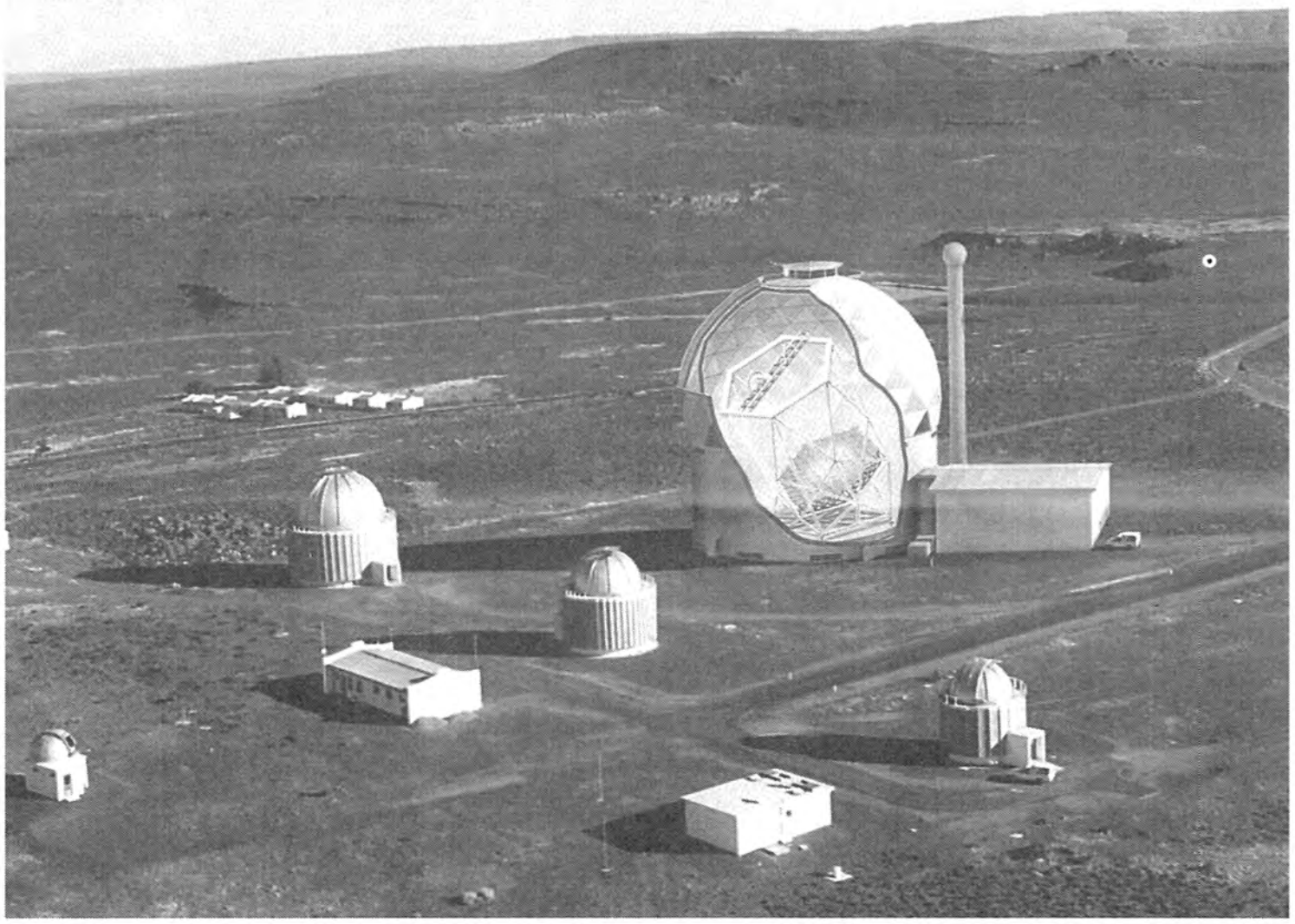
The Sidereal Times

XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.3: Wednesday, 20 August



A New Telescope Worth Its SALT

The Southern African Large Telescope (SALT) is a proposal by South Africa to construct a 10 m class telescope for optical/infrared astronomy. This telescope will be located in the clear, dark skies of the Karoo, at the Sutherland outstation of the South African Astronomical Observatory.

The design of SALT will be based on a southern hemisphere equivalent of the Hobby-Eberly Telescope nearing completion at McDonald Observatory, Texas. This telescope is of revolutionary design for an optical/infrared telescope, being effectively a tilted Arecibo design. The telescope is at a fixed tilt of 35 degrees to the zenith and has full 360 degrees rotation in azimuth. During an exposure, the telescope is stationary and an object is followed for up to 12 degrees across the sky by a tracker beam at the prime focus. Thus an object can be observed in an annulus 12 degrees wide centered on 35 degrees from the zenith.

The primary mirror is 11 m across, comprising 91 hexagonal, 1-meter segments. The figure is spherical, and a 4-element corrector at the prime focus corrects the spherical aberration over a 4 arcmin field. The total error budget of the telescope is 0.6 arcsec, designed to not significantly degrade the median seeing of the site (0.9 arcsec FWHM). The maximum portion of the primary imaged at any one time is 9.2 m across.

The main instrumentation will be low, medium and high resolutions spectrographs fed by fiber from the prime focus, and with multi-object spectroscopic capability. In addition, a prime focus imager will give an image capability over a 4 arcmin field.

This telescope is primarily designed as a spectroscopic survey instrument and will be most effective for projects where objects are uniformly distributed across the sky or clustered on small scales. The telescope can tackle a wide variety of science from spectroscopic studies of the early universe to searching for planets around nearby stars. The nature of the telescope means that it will be operated in queue-scheduled mode. It thus will be particularly suited to repeat observations of objects that vary on time scales longer than one day, and that require observations over a long period of time.

The total construction cost of the telescope and its building is US $20 million, about one-fifth that of a conventional 10 m class telescope. The substantial cost savings have been achieved by building a telescope suited to a more specialized scientific mission.

South Africa is actively seeking international partners to participate in this project. The proposal is that the South African government fund 50% of the cost, and the remainder is to be found from international partners. The HET Board has expressed its interest in making all the detailed designs and plans available in return for telescope time. Other universities in the USA have also expressed an interest.

If you wish to learn more about this project, please contact Bob Stobie via the mail box during the IAU or afterward by E-mail (rss@saao.ac.za).

BOB STOBIE
South African Astronomical Observatory

Royal Visit Today

A rare opportunity to hear from His Majesty the Emperor of Japan will be part of the Opening Ceremonies that begin today at 13:30 in the Main Hall. The schedule of events can be found on the yellow sheet included in your registration materials. You may wish to review same, for otherwise you may not recognize all the players in this exceptional event.

Two items of importance: (1) You are required, for obvious security reasons, to wear your name badge throughout the day on the 20th. Admission to the KICH will be denied should you be badge-less. (2) Please wait to take photos of His Majesty until after 15:00.

Their Majesties, the Emperor and Empress

Unlike many of the world's royalty, Emperor Akihito has a strong and direct interest in science. Born in 1933 as Emperor Showa's first son (of seven children), Akihito ascended to the throne in 1989. He is a trained ichthyologist, and has published over two dozen papers in the Journal of the Ichthyological Society of Japan. He has also written a review article for Science magazine, entitled "Early Cultivators of Science in Japan" (Science, 258, 578,1992). Few of the world's crowned heads can claim a comparable publication list in the scientific literature.

The Emperor and his wife, Empress Michiko (they were married in1959) take an active interest in academic matters. Every year they attend the award ceremony of the Japanese Academy of Sciences, and are pleased to have prize recipients explain their research. After the ceremony, the recipients are brought to the imperial palace for lunch with the Emperor and Empress. Each January, the royal couple invite three distinguished scholars to deliver lectures. In addition to these official occasions, they often invite scientists (including astronomers) for informal talks, and will frequently visit academic institutes.

While the Emperor Akihito was still prince, he and his family visited the Norikura Corona Observing Station in 1967, Nobeyama Radio Observatory in 1985, and Tokyo Astronomical Observatory (Mitaka) in 1986 when Halley's comet was visible. Although they did not wish to disturb the astronomers, they were extremely pleased to be able to view the comet through the observatory's refractor.

The Emperor and Empress have two sons and one daughter. I know that the current prince, Hironomiya, has been interested in astronomy since he was quite young. He has made visits to the Tokyo Astronomical Observatory, Mitaka, and the Okayama Astrophysical Observatory to observe stars. And I have heard that when he studied at Oxford, he enjoyed making observations through a small telescope.

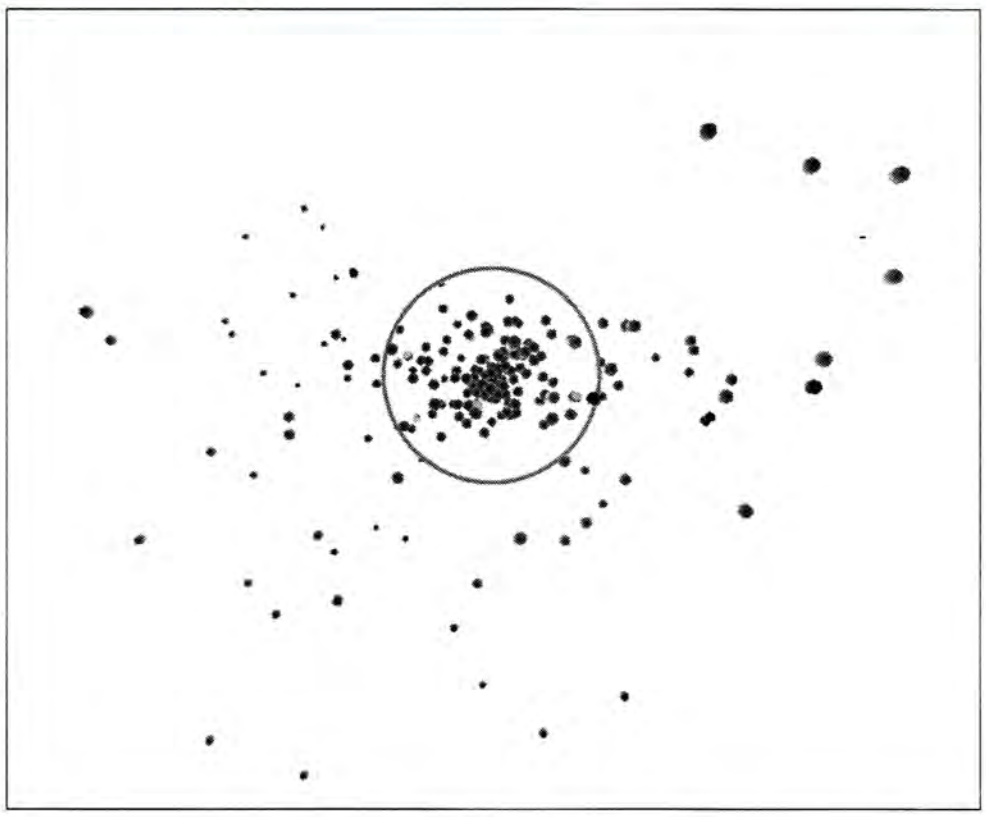
There is a long tradition for naming newly-discovered astronomical objects after royalty. Two asteroids bear the names of former Japanese emperors. They are (5017) Tenchi=1977 DS_2, discovered by H. Kosai and K. Hurukawa at the Kiso Station of the Tokyo Astronomical Observatory. Tenchi was named for the emperor who made the first Japanese clepsydra in 660 ad. The following year, Tenchi inaugurated this elaborate water clock, a device which sounded out the hours with bells and drums. June 10 is still designated 'Time Day' in Japan.

Yoshihide Kozai

Among the many other astseroids discovered by Kosai and Hurukawa in 1977 was one which they named (5018) Tenmu=1977 DY_8. Emperor Tenmu was the younger brother of Tenchi, and was skilled in both astronomy and the art of divination. He initiated the construction of the first Japanese observatory in 675 ad.

The widow of the late Dr. Katsuo Tanaka, a solar physicist who was principal investigator for Hinotori, the first Japanese solar satellite, is now in the Empress' service. It is likely that she will come to the Opening Ceremony, although she will not be on the platform with the Empress as she is the least senior staff member.

YOSHIDE KOZAI
National Astronomical Observatory of Japan



Now playing at a Web site near you — The Hyades in 3-D!

The Hyades in 3-D

During next Monday's Joint Discussion 14, the results obtained by Perryman et al. on the Hyades Cluster with HIPPARCOS data will be presented by Anthony Brown. The aims of this study were naturally to pin down the distance to the Hyades and the location of its main sequence. But in addition, using the trignonometric parallaxes measured by HIPPARCOS, one can construct the three-dimensional structure of the cluster. To visualize this structure, a movie was made. It shows the 3-D positions of those Hyades members identified in the HIPPARCOS data as seen from the location of the Sun. The cluster is rotated around the galactic z-axis to show the full 3-D structure. In addition, the tidal radius of the cluster is shown to illustrate the large number of Hyades members beyond this formal dynamical limit. The positions of some of the stars in the Hyades moving group are shown, and the movie ends with an impression of the measured motions of the stars.

To see the movie, go to http://www.strw.leidenuniv.nl/~brown/hyades.html, or to ESA's HIPPARCOS home page, http://astro.estec.esa.nl/sa-general/projects/hipparcos/hipparcos.html.

ANTHONY BROWN
Leiden University

Accent on Acronyms

Welcome to "Accent on Acronyms," a column of the Task Group on Designations by H.R. Dickel (Chair of the Task Group)

The mission of the Task Group on Designations is to promote clear and unambiguous identifications for all astronomical objects outside the solar system. The TG attempts to clarify existing astronomical designations and reviews, updates and advertises the IAU Recommendations for Nomenclature (http://cdsweb.u-strasbg.fr/iau-spec.html).

To learn about recent developments of the TG, come to room G on Thursday, August 21 at 11 am. Members of the FITS TG, Data Centers, libraries and those involved in electronic publishing are especially encouraged to attend so that we can discuss common problems.

H.R. DICKEL
Chair, IAU Task Group on Designations

Draft Resolution B1
On the use of Julian dates

The International Astronomical Union, recognizing

a. the need for a system of continuous dating for the purpose of analyzing time-varying astronomical data, and

b. that both Julian Dates and Modified Julian Dates have been employed for this purpose in astronomy, geodesy, and geophysics,

recommends that

a. Julian Date (as defined in the appendix) be used to record the instants of the occurrences of astronomical phenomena,

b. that for those cases where it is convenient to employ a day beginning at midnight, the Modified Julian Date (equivalent to the Julian Date minus 2400 000.5) be used, and

c.that where there is any possibility of doubt regarding the usage of MJD,care be exercised to state specifically its definition.

APPENDIX. PROPOSED DEFINITIONS

The following definitions are recommended

1. Julian day number (JDN)

The Julian day number is the number assigned to a day in a continuous count of days beginning with the Julian day number 0 assigned to the day starting at Greenwich mean noon on 1 January 4713 BC, Julian proleptic calendar (-4712).

2. Julian Date (JD)

The Julian Date (JD) of any instant is the Julian day number for the preceding noon plus the fraction of the day since that instant. A Julian Date begins at 12h 0m 0s and is composed of 86400 seconds. To determine time intervals in a uniform time system it is necessary to express the JD in a uniform time scale. For that purpose it is recommended that JD be specified in Terrestrial Time (TT) where the length of day is 86,400 SI seconds.

In some cases it may be necessary to specify Julian Date using a different time scale. (See Seidelmann, 1992, for an explanation of the various time scales in use). The time scale used should be indicated when required such as JD (UT1). Note that time intervals calculated from differences of Julian Dates specified in non-uniform time scales, such as UTC, may need to be corrected for changes in time scales (e.g. leap seconds).

An instant in time known in UTC can be converted to Terrestrial Time if such precision is required. Values of TT-UT are available using tables in McCarthy and Babcock (1986) and Stephenson and Morrison (1984, 1995). Table 1 provides the difference between TAI and UTC from 1961 through 1 January 1996. The difference between TT and UTC can be calculated knowing that TT =TAI + 32.184s. The Annual Reports of the International Earth Rotation Service should be consulted for dates after 1996. The data of Table 1 are also available electronically at

http://maia.usno.navy.mil or at

ftp://maia.usno.navy.mil/ser7 /tai-utc.dat.

Table 1

Difference between the TAI and UTC time scales.
TT-UTC can be calculated by adding 32.184s to TAI-UTC.

1961 Jan 1 = JD 2 437 300.5 TAI–UTC = 1.4228180s+ (MJD –37300.)× 0.001296s
1961 Aug1 = JD 2 437 512.5 TAI–UTC = 1.3728180s+ (MJD –37300.) × 0.001296s
1962 Jan 1 = JD 2 437 665.5 TAI–UTC = 1.8458580s+ (MJD –37665.) × 0.0011232s
1963 Nov1 = JD 2 438 334.5 TAI–UTC = 1.9458580s+ (MJD –37665.) × 0.0011232s
1964 Jan 1 = JD 2 438 395.5 TAI–UTC = 3.2401300s+ (MJD –38761.) × 0.001296s
1964 Apr 1 = JD 2 438 486.5 TAI–UTC = 3.3401300s+ (MJD –38761.) × 0.001296s
1964 Sep 1 = JD 2 438 639.5 TAI–UTC = 3.4401300s+ (MJD –38761.) × 0.001296s
1965 Jan 1 = JD 2 438 761.5 TAI–UTC = 3.5401300s+ (MJD –38761.) × 0.001296s
1965 Mar1 = JD 2 438 820.5 TAI–UTC = 3.6401300s+ (MJD –38761.) × 0.001296s
1965 Jul 1 = JD 2 438 942.5 TAI–UTC = 3.7401300s+ (MJD –38761.) × 0.001296s
1965 Sep 1 = JD 2 439 004.5 TAI–UTC = 3.8401300s+ (MJD –38761.) × 0.001296s
1966 Jan 1 = JD 2 439 126.5 TAI–UTC = 4.3131700s+ (MJD –39126.) × 0.002592s
1968 Feb 1 = JD 2 439 887.5 TAI–UTC = 4.2131700s+ (MJD –39126.) × 0.002592s
1972 Jan 1 = JD 2 441 317.5 TAI–UTC =10.0s
1972 Jul 1 = JD 2 441 499.5 TAI–UTC =11.0s
1973 Jan 1 = JD 2 441 683.5 TAI–UTC =12.0s
1974 Jan 1 = JD 2 442 048.5 TAI–UTC =13.0s
1975 Jan 1 = JD 2 442 413.5 TAI–UTC =14.0s
1976 Jan 1 = JD 2 442 778.5 TAI–UTC =15.0s
1977 Jan 1 = JD 2 443 144.5 TAI–UTC =16.0s
1978 Jan 1 = JD 2 443 509.5 TAI–UTC =17.0s
1979 Jan 1 = JD 2 443 874.5 TAI–UTC =18.0s
1980 Jan 1 = JD 2 444 239.5 TAI–UTC =19.0s
1981 Jul 1 = JD 2 444 786.5 TAI–UTC =20.0s
1982 Jul 1 = JD 2 445 151.5 TAI–UTC =21.0s
1983 Jul 1 = JD 2 445 516.5 TAI–UTC =22.0s
1985 Jul 1 = JD 2 446 247.5 TAI–UTC =23.0s
1988 Jan 1 = JD 2 447 161.5 TAI–UTC =24.0s
1990 Jan 1 = JD 2 447 892.5 TAI–UTC =25.0s
1991 Jan 1 = JD 2 448 257.5 TAI–UTC =26.0s
1992 Jul 1 = JD 2 448 804.5 TAI–UTC =27.0s
1993 Jul 1 = JD 2 449 169.5 TAI–UTC =28.0s
1994 Jul 1 = JD 2 449 534.5 TAI–UTC =29.0s
1996 Jan 1 = JD 2 450 083.5 TAI–UTC =30.0s

Draft Resolution B2
On Reference Frames

Considering

(a) That Recommendation VII of Resolution A4 of the 21st General Assembly specifies the coordinate system for the new celestial reference frame and, in particular, its continuity with the FK5 system at J2000.0;

(b) That Resolution B5 of the 22nd General Assembly specifies a list of extragalactic sources for consideration as candidates for the realization of the new celestial reference frame;

(c) That the IAU Working Group on Reference Frames has in 1995 finalized the positions of these candidate extragalactic sources in a coordinate frame aligned to that of the FK5 to within the tolerance of the errors in the latter (see note 1);

(d) That the Hipparcos Catalogue was finalized in 1996 and that its coordinate frame is aligned to that of the frame of the extragalactic sources in (c) with one sigma uncertainties of ± 0.6 milliarcseconds (mas) at epoch J1991.25 and ± 0.25 mas per year in rotation rate; Noting

That all the conditions in the IAU Resolutions have now been met;

Resolves

(a) That, as from 1 January 1998, the IAU celestial reference system shall be the International Celestial Reference System (ICRS) as specified in the 1991 IAU Resolution on reference frames and as defined by the International Earth Rotation Service (IERS) (see note 2);

(b) That the corresponding fundamental reference frame shall be the International Celestial Reference Frame (ICRF) constructed by the IAU Working Group on Reference Frames;

(c) That the Hipparcos Catalogue shall be the primary realization of the ICRS at optical wavelengths;

(d) That IERS should take appropriate measures, in conjunction with the IAU Working Group on reference frames, to maintain the ICRF and its ties to the reference frames at other wavelengths.

Note 1: IERS 1995 Report, Observatoire de Paris, p.II-19 (1996).

Note 2: "The extragalactic reference system of the International Earth Rotation Service (ICRS)", Arias, E.F. et al. A & A 303, 604 (1995).

Draft Resolution B3
On the establishment of a relativistic coherent reference frame

The XXIII General Assembly of the IAU,

considering that

— the IAU Resolution A4 (1991) has set up a general relativistic framework to define reference systems centered at the barycenter of the solar system and at the geocenter,

— the Sub Working Group on Relativity in Celestial Mechanics and Astrometry, established by IAU Resolution C6 (1994), reports that relativity has to be taken into account for all astronomical and geodynamical observations but that the framework of IAU Resolution A4 (1991) is not sufficient for some applications, and that the current terminology should be changed to be consistent in the general relativistic framework,

— a consistent system of notations is desirable and should be used in all fields of astronomy, geodesy and metrology that deal with space-time references,

noting that

— work on these matters is also being carried out in several other organizations of different types; in the BIPM (an intergovernmental organization), in the IAG (a scientific union), in the IERS (a service of IAU and IUGG),

— it is of utmost importance that all interested parties adopt consistent definitions and conventions in a coherent general relativistic framework,

— the BIPM has proposed a collaboration with the IAU to realize this goal, recommends that

— a Joint Committee of the BIPM and the IAU should be formed, its tasks being to establish definitions and conventions, to provide a coherent relativistic frame for all activities in space-time references and metrology at a sufficient level of uncertainty, to establish a uniform system of notations for quantities and units, and to develop the adopted definitions and conventions for practical application by the user,

— the IUGG should be invited to participate in this Joint Committee to ensure that a coherent system is agreed by the scientific community,

— the organizations taking part in the Joint Committee should adopt Resolutions or Recommendations, each following its own procedures, with the aim of having identical definitions, conventions and notations based on the conclusions of the Committee.

BIPM: Bureau International des Poids et Mesures

IAG: International Association of Geodesy

IERS: International Earth Rotation Service I

UGG: International Union for Geodesy and Geophysic

Draft Resolution B4
On Non-Rigid Earth Nutation Theory

The International Astronomical Union Recognizing

that the International Astronomical Union and the International Union of Geodesy and Geophysics Working Group (IAU-IUGG WG) on Non-rigid Earth Nutation Theory has met its goal by identifying the remaining geophysical and astronomical phenomena that must be modeled before an accurate theory of nutation for a non-rigid Earth can be adopted, and

that, as instructed by the 1994 IAU Recommendation C1, the International Earth Rotation Service (IERS) has published in the IERS Conventions (1996) an interim precession-nutation model that matches the observations with an uncertainty of ± 1 milliarcsecond (mas),

endorses

the conclusions of the IAU-IUGG WG on Non-rigid Earth Nutation Theory given in the appendix,

requests

the IAU-IUGG WG on Non-rigid Earth Nutation Theory to complete a detailed report to be presented at the time of next IUGG General Assembly (August 1999), when the WG will be discontinued,

and urges the

scientific community to address the following questions in the future:

— establishment of a new rigid Earth nutation series with the additional terms necessary for the theory to be complete to within +/- 5= microarcseconds, and

— establishment of a new non-rigid Earth transfer function for an Earth initially in non-hydrostatic equilibrium, incorporating mantle inelasticity and a Free Core Nutation period in agreement with observations, and taking into account better modeling of the fluid parts of the planet, including dissipation.

Appendix to Resolution 1 JD 3:

Conclusions of the IAU-IUGG WG on Non-rigid Earth Nutation Theory:

The WG on Non-rigid Earth Nutation Theory has quantified the problems in the IAU 1980 adopted nutation series by noting:

(1) that there was a difference in the precession rate of about -3.0 milliarcseconds per year (mas/year) between the observed (by Very Long Baseline Interferometry (VLBI) and Lunar Laser Ranging (LLR)) and adopted values,

(2) that there was an observed (by VLBI and LLR) obliquity rate of about -0.26 mas/year which is not existing in the 1980 IAU precession-nutation theory,

(3) that, in addition to these trends, there were observable differences (peak-to-peak) in the time domain of up to 20 milliarcseconds (mas) between the VLBI and LLR observed nutation and the 1980 IAU adopted nutation, and

(4) that these differences correspond to differences in the frequency domain up to several mas,

(5) that the differences between observation and theory are far above the present observation precision.

The WG has recognized the improvements done in the modeling of these quantities, and recommends, to derive a more precise nutation model, at the mas level in the frequency domain, and at a few mas level in the time domain, the use of models:

(1) based on a new non-rigid Earth transfer function for an Earth initially in non-hydrostatic equilibrium, incorporating mantle inelasticity, a core-mantle-boundary flattening giving a Free Core Nutation (FCN) period in agreement with the observed one, and a global Earth dynamical flattening in agreement with the observed precession, and

(2) based on a new rigid Earth nutation series which takes into account the following perturbing effects:

1. at the level of the lunisolar ephemerides: indirect planetary effects, lunar inequality, J_2-tilt, planetary-tilt, secular variations of the amplitudes, effects of the precession and the nutation,

2. at the level of the perturbing bodies to be considered: in addition to the Moon and the Sun, it is necessary to include the direct planetary effects from Venus, Jupiter, Mars, and Saturn,

3. at the level of the order of the external potential to be considered: J_3 and J_4 effects coming from the Moon,

4. at the level of the theory itself: effects of the tri-axiality of the Earth, relativistic effects and second order effects.

The WG recognizes that this new generation of models still has some imperfections, the main one being that the theories suffer from a lack of dissipation in the core and from unmodeled effects of the ocean and the atmosphere, and urges the scientific community to address these questions in the future.

The WG recognizes that, due to the remaining imperfections of the present theoretical nutation models, the nutation series published in the IERS Conventions (1996) following the 1994 IAU recommendation C1, still provides the users with the best nutation series. This IERS model being based on observations of the celestial pole offset, the WG

supports the recommendation that the scientific community continue VLBI and LLR observations to provide accurate estimations of nutation, precession and obliquity rate.

Draft Resolution B5
On the New International Celestial Reference System (ICRS), and the Hipparcos Catalogue

The International Astronomical Union considering

(1) that the International Astronomical Union (IAU) has adopted an International Celestial Reference System (ICRS) in which the axes are fixed relative to the distant background as implied by observations of extragalactic sources,

(2) that the realization of the ICRS is based on observations made from the Earth, the axis of which precesses and nutates relative to the ICRS,

(3) that there are significant differences between the 1980 IAU adopted nutation and astronomical observations,

(4) that there is an observed obliquity rate which is not existing in the 1980 IAU precession-nutation theory, and

(5) that there is a difference in the precession rate of about -3.0 milliarcseconds per year (mas/year) between the observed and adopted values,

recommends

(1) that the Division 1 form a new Working Group to report to the IAU General Assembly in 2000 which will

a. examine and clarify the effects, on astrometry computations, of changes such as the adoption of the International Celestial Reference System, the availability of the Hipparcos catalogue, and the change foreseen in the conventional precession-nutation model, and

b. make recommendations regarding the algorithms to be used,

(2) and that this Working Group works in conjunction with the International Earth Rotation Service (IERS) and be closely related with the IAU Working Group on Reference Frames, the IAU Working Group on Astronomical Constants, and the IAU-IUGG Working Group on Non-rigid Earth Nutation Theory (until its close at the 1999 IUGG General Assembly), through exchange of representatives.

Draft Resolution B6
On Relativity in Celestial Mechanics and Astrometry

The XXIIIrd General Assembly of the International Astronomical Union

considering that

a relativistic solar system barycentric four-dimensional coordinate system with its coordinate time scale TCB was defined by International Astronomical Union (IAU) Resolution A4 (1991),

a relativistic geocentric four-dimensional coordinate system with its coordinate time scale TCG was defined by IAU Resolution A4 (1991) and International Union of Geophysics and Geodesy (IUGG) Resolution 2 (1991),

and

the basic physical units of space-time in all coordinate systems were recommended by IAU Resolution A4 (1991) to be the SI second for proper time and the SI meter for proper length,

noting that

practical realization of barycentric and geocentric coordinate systems in many groups (see International Earth Rotation Service (IERS) Standards, 1992) is based on time scales TDB and TT instead of TCB and TCG, respectively, and involves the scaling factors 1-L_B and 1-L_G for the spatial coordinates and mass factors GM in barycentric and geocentric systems, respectively, L_B and L_G being given in IAU Resolution A4 (1991),

even more complicated scaling factors are introduced in the VLBI (Very Long Baseline Interferometry) model of IERS Conventions (1996),

and astronomical constants and currently employed definitions of fundamental astronomy concepts are based on Newtonian mechanics with its absolute space and absolute time leading to ambiguities in dealing with relativistic effects,

recommends that

the spatial coordinates of the Barycentric and Geocentric Reference Systems as defined by the IAU (1991) resolutions be used for celestial and terrestrial reference frames, respectively, without any scaling factors,

the final practical realizations of the coordinate systems for use in astronomy and geodesy be implementations of the systems defined by IAU-IUGG (1991) resolutions,

the use of TT for convenience of observational data analysis be not accompanied by scaling of the spatial geocentric coordinates,

algorithms for astronomical constant determination and definitions of fundamental astronomy concepts be explicitly given within the basic reference systems envisaged by IAU-IUGG (1991) resolutions, and

IAU Working Group on Astronomical Standards (WGAS) continue the consideration of relativistic aspects of the concepts, algorithms and the constants of fundamental astronomy.

Draft Resolution B7
On Encouraging VLBI and LLR Observations

The International Astronomical Union noting

1) resolution #1 of the IAU Joint Discussion 7 ('The New International Celestial Reference Frame'),

2) resolution #1 of the IAU Joint Discussion 3 ('Precession-Nutation and Astronomical Constants for the Dawn of the 21st Century'),

considering

1) that regular observation by Very Long Baseline radio Interferometry VLBI) is the only way to maintain the International Celestial Reference Frame (ICRF),

2) that observation by Lunar Laser Ranging (LLR) is important to monitor the solar system reference system in relation to the ICRF, and

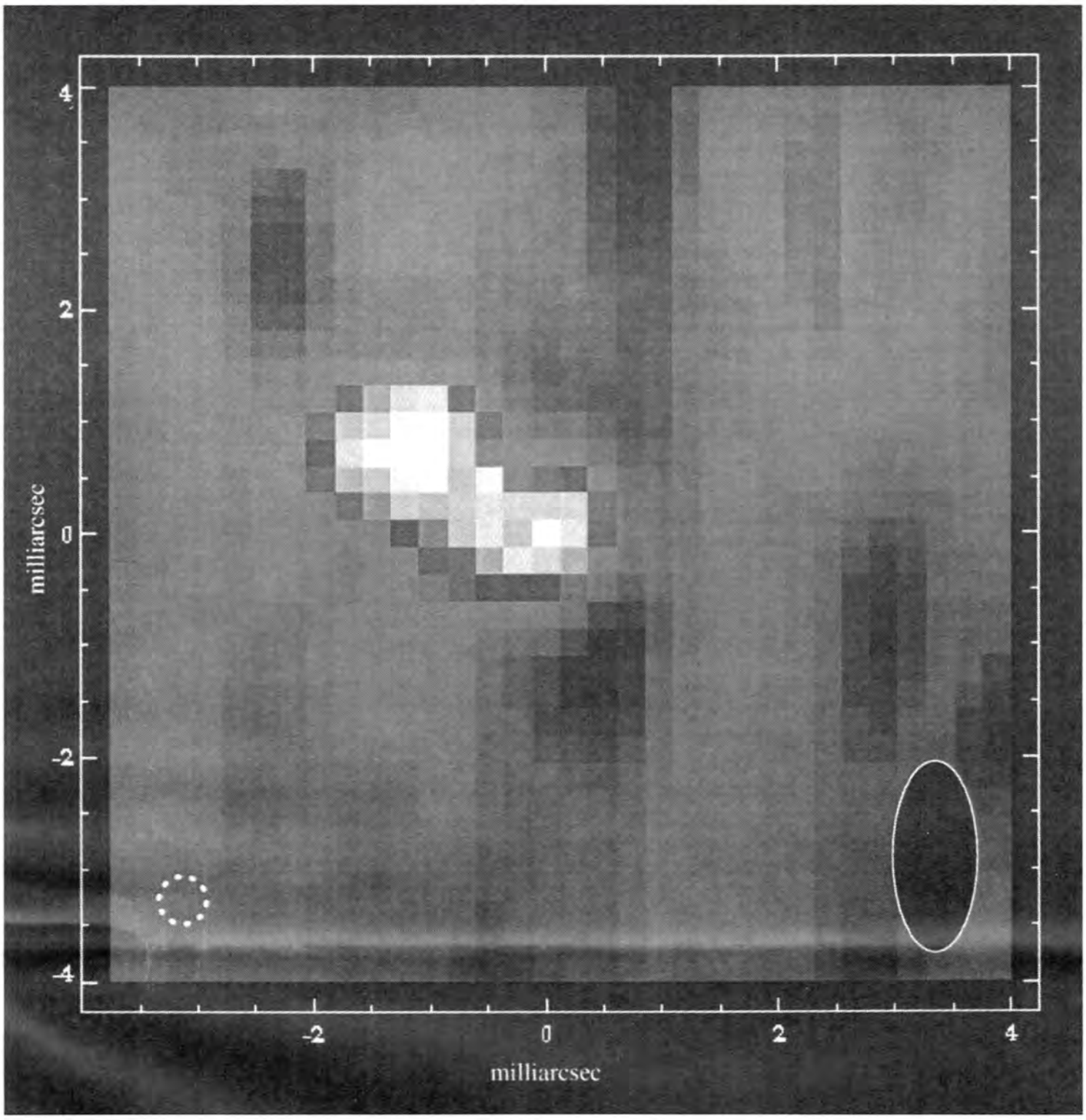
3) that VLBI and LLR are the basic observational techniques to determine precession and nutation of the Earth,

recommends

that high-precision astronomical observing programs be organized in such a way that

1) astronomical reference systems can be maintained at the highest possible accuracy for both northern and southern hemispheres, and

2) high accuracy observations of precession-nutation are available for comparison with geophysical models and for astronomical and geodetic applications.



Cleaned map image of UV Cet B observed with the combined VLBA and VLA by A. Benz, J. Conway, and M. Guedel. The scale is in milliarcseconds. THe size of the photospheric disk is indicated by a dashed circle in the lower left corner for comparison. The size of the beam is shown in the lower right corner.

First Image of a Main Sequence Star!

Very long baseline interferometry has become sensitive enough to resolve the nearest main-sequence stars. In the figure you can see the first radio image of a single star's corona. My colleagues and I, all from ETH Zurich, have observed UV Cet B at a distance of 2.7 pc with sub-milliarcsecond resolution. The image shows basically two components separated by 4.5 stellar radii. They are aligned exactly with the rotation axis of the star.

The radio emission is caused by relativistic electrons emitting gyro-synchrotron radiation. The particles are trapped in the magnetic fields of the corona, and emit preferentially at that place on their orbit where the field strength is highest.

The most likely interpretation of the image is a corona shaped by a large, dipolar magnetic field 10 stellar radii in extent. The fully convective star is thus probably located between the two observed components. The radio emission therefore originates preferentially from above the poles of rotation, which are close to the magnetic poles. The two components then may be identified with the mirror points of the trapped particles.

UV Cet B is a young M-star close to zero age main-sequence. The shape of the corona is of relevance to the evolution of such stars, in particular to their loss of angular momentum.

The new data will be presented in Commission 40 and in a poster.

ARNOLD BENZ
Institute of Astronomy, ETH, Zurich

Change in Subways

As part of its normal summer procedure, and to air out the tubes generally, the Kyoto Transport Authority has informed us that, beginning tomorrow all subways will be operating above ground.

International School for Young Astronomers (ISYA)

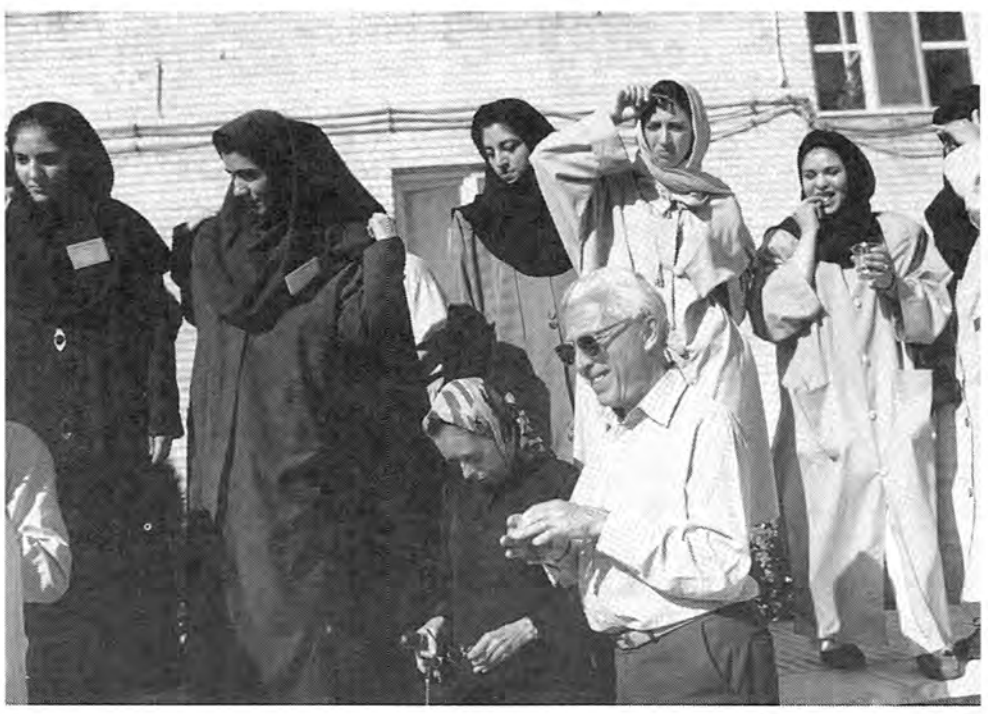
The 23rd ISYA met July 4 - 23, 1997 in the mile-high city of Zanjan, Iran on the attractive campus of the Institute for Advanced Studies in Basic Sciences (IASBS). The IAU provided travel grants to 14 foreign participants from seven countries. Among 24 Iranian participants from eleven universities and IASBS, almost half were women. IASBS provided housing, meals, and meeting facilities.

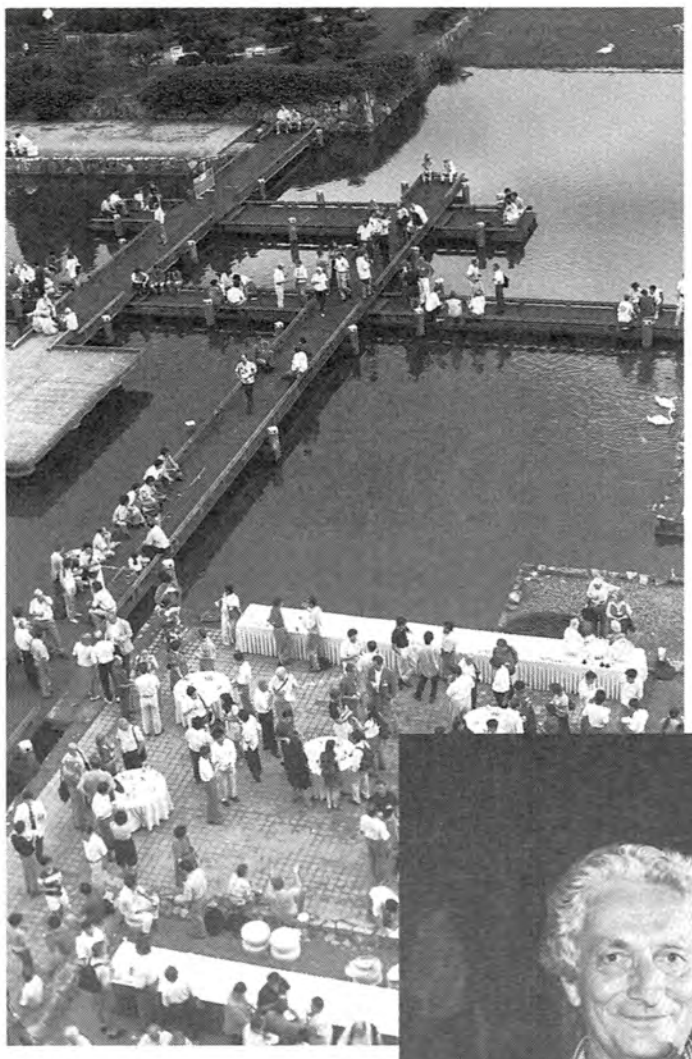
A major goal of ISYA is to demonstrate, to scientifically isolated students, the exciting challenge and discovery of astronomy, and the importance of questions, discussions, judgment on evidence, etc. This goal was so obviously achieved that we ended the ISYA one day earlier than planned. Important for a quick start was the opportunity, present from the first day, to make daytime and nighttime observations, and that, for the first time at an ISYA, nearly all participants spoke adequate English for conversation from the beginning.

Lecture topics included chaos in the solar system, gravitational lenses, stellar atmospheres, solar MHD, binary stars, gamma rays, and more. The process of installing MIDAS on one PC demonstrated the difficulties that will be encountered when such programs are to be installed at other astronomically developing institutions.

DONAT WENTZEL
ISYA Secretary

Participants in the ISYA look on as Donat Wentzel and his wife head for tea break.

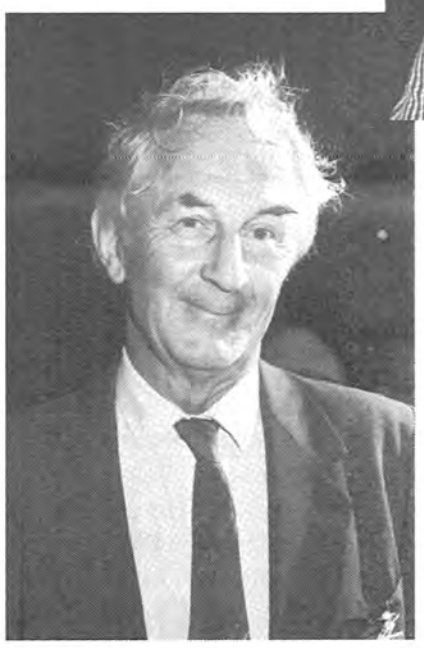


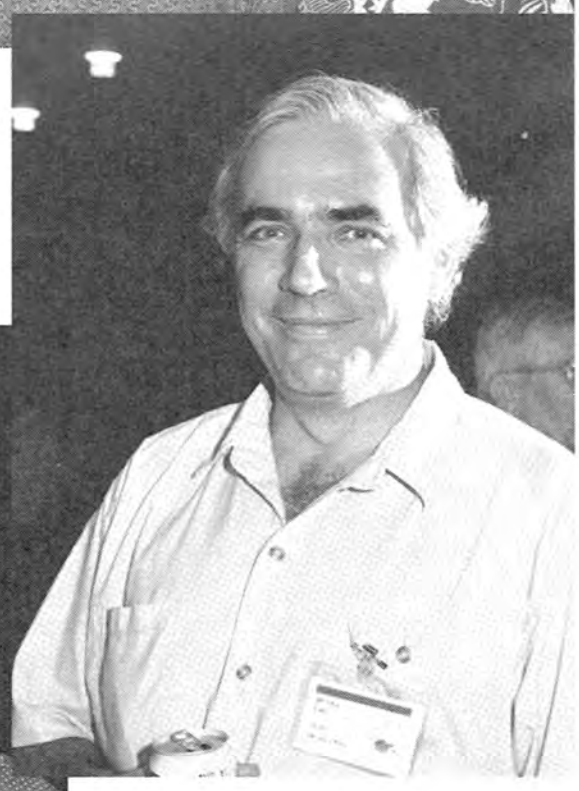


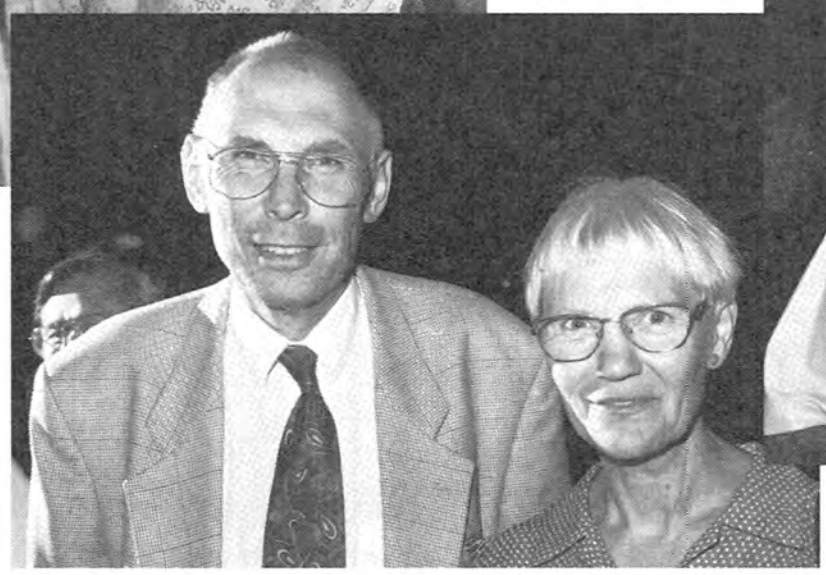
Warm Reception

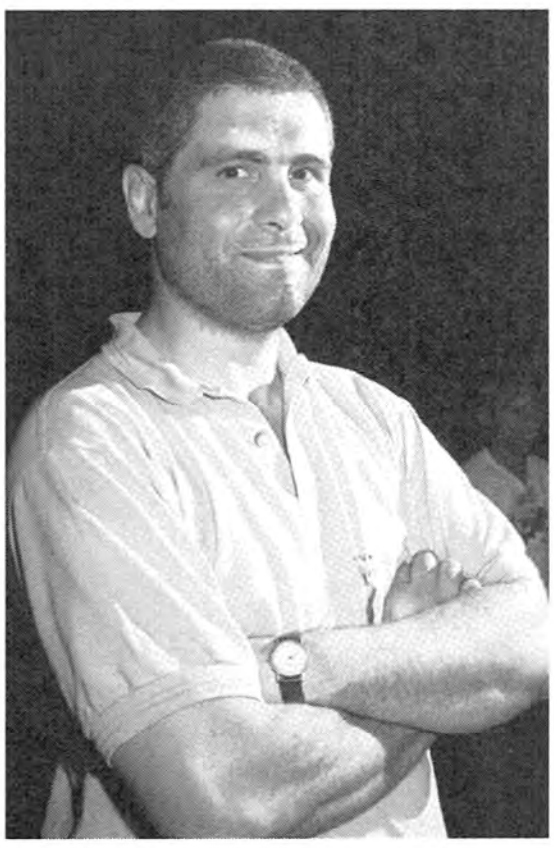
An informal reception in the KICH gardens lured many of the 1,400 GA attendees outdoors yesterday evening. Drawn by the thought of warm friends and cold beer, approximately 100,000 kg of humanoid protoplasm oozed out onto the patio and docks facing Lake Tagaragaike, and stayed there despite air temperatures that sent the swans flying north.

During the festivities, the Sidereal Times' roving photographic crew caught many participants feigning pleasure at having their portraits taken. You may recognize yourself, a colleague, or even an aggressive referee in the accompanying montage.









Marathon Doesn't Make It

The marathon from the KICH to Osaka Airport and back, intended for the amusement and physical improvement of all GA participants, has been cancelled. The reason given for the cancellation has been the 100% humidity and daytime temperatures approaching the melting point of molybdenum. The fully-equipped Lexus automobiles intended as prizes for the first 300 GA attendees to complete the marathon have been donated to charity.

The Sidereal Times

IAU XXIIIrd General Assembly - Kyoto 1997

Kyoto IAU 23

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.4: Thursday, 21 August

Emperor Akihito Opens Assembly

The IAU's 23rd General Assembly was opened yesterday afternoon by dignitaries from the Japanese astronomical community, the President of the IAU, and most eminently, His Majesty Emperor Akihito. The Emperor told a rapt audience of the early history of Japanese astronomy, including a 6th century adoption of a Chinese calendar system. More than a thousand years later, the deficiencies in these ancient works prompted Japan to develop a deepening interest in European science, an interest that was often difficult to pursue because of a policy of isolation (*Sakoku*). Copernicus' solar system theories were introduced in Japan two centuries after they were first proposed in Europe. However, since the middle of the 19th century, Japan has enthusiastically stepped into the arena of modern, scientific research. This General Assembly, the first to be held in Japan, and only the second to be held in Asia, is one more step along this exciting path. The Emperor wished the participants well.

Prospecting in the Stellar Graveyard

How old is the disk of the Galaxy? In IAU Symposium 183 and Joint Discussion 10 a number of modern methods for estimating the age of the Galaxy and the universe are being discussed and compared. Current determinations of the Hubble constant obtained from standard candles such as supernovae and Cepheid variable stars in nearby clusters of galaxies imply ages for the universe that are consistently younger than the ages of globular clusters in our own Galaxy. Although this discrepancy has narrowed with improved observational data and theoretical models, it has not yet been eliminated.

White dwarf stars are the final evolutionary state for the vast majority of stars. No longer generating energy, they cool slowly enough that even the oldest are still observable in sufficiently deep surveys. The cooling ages of white dwarfs therefore preserve a unique record of the star formation history of the local disk of the Milky Way near the Sun. Deep searches for white dwarf stars fail to find any that are cooler than about 4,000 K. Apparently the Galaxy is not old enough for even the remnants of the first generation of stars in the Galactic disk near the sun, which are now white dwarfs, to have cooled to the temperature of interstellar space and become invisible. Therefore, the ages of the faintest, coolest white dwarfs provide a robust lower limit to the epoch at which star formation began in the solar neighborhood, much like finding the oldest rocks in your backyard gives a minimum age estimate for the Earth.

In a large survey, Oswalt and collaborators have found a number of white dwarf stars that have cooling ages approaching 10 billion years. The team used new models to interpret the observed luminosity function for white dwarf stars (a plot of the space density of stars vs. luminosity) and estimated that star formation began in the solar neighborhood about 9.5 billion years ago, within an uncertainty of about 10%. This age estimate is independent of all other methods of determining the age of the Galaxy.

Adding the time span between the Big Bang and the first star formation in the halo of the Galaxy (~1 billion years) to the age of the solar neighborhood implied by the coolest white dwarfs (~10 billion years), plus any probable delay between the onset of star formation in the halo and local disk (> 1 billion years), the group estimated that the universe must be at least 11.5 billion years old. As expected, this age is younger than the ages estimated for globular clusters, but it is not compatible with most current estimates of the universe derived from the Hubble constant. See the poster JD10-002P for details!

TERRY OSWALT
Florida Institute of Technology

Accessing the Astronomical Literature through the NASA ADS Abstract Service

Eichhorn checks out the ADS, and gains instant access to the literature without the danger of paper cuts.

The Astrophysical Data System provides access to almost 1,000,000 astronomy, instrumentation, and space physics abstracts via the World Wide Web. We also provide access to full journal articles for any journal that gives us permission to do so. We currently have over 30,000 articles on-line. This service is free and available to everybody. We don't charge for access or for including abstracts or articles in our system.

The ADS abstracts service is accessible through the WWW at:
http://adswww.harvard.edu/ads_abstracts.html. The journal articles are accessible at:
http://adswww.harvard.edu/ads_articles.html

The ADS is by now the most widely used bibliographic tool in astronomy. As an example, in July we had over 10,000 users issue about 250,000 queries and retrieve almost 4.5 million references. Most astronomers rely on us completely for their literature searches.

Some recent additions to the data in the ADS are the IAU circulars, and the preprints from the Los Alamos preprint server.

We have also established a second mirror site of the ADS here in Japan at NAO in Tokyo (after our first mirror at the CDS in Strasbourg, France). This mirror not only gives access to the abstracts but also to the full journal articles that we provide.

We have full journal articles on-line for most back issues of the last 20 years for all major and many minor astronomy journals. We scan the journals that give us permission with 600 dpi resolution. We then produce three versions of each page: A 100 dpi grey scale gif image for viewing on-screen, a 200 dpi and a 600 dpi tiff g4 compressed version for printing. These versions are converted to Postscript when they are retrieved.

We currently have 20 years of the *Astrophysical Journal Letters*, the *Astronomical Journal*, the *Publications of the Astronomical Society of the Pacific*, the *Publications of the Astronomical Society of Japan*, *Publications of the Astronomical Society of Australia*, *Revista Mexicana*, *Observatory Reports* from Skalnate Pleso, Slovakia, *Bulletins of the Astronomical Society of India*, and 5 years of the *Astrophysical Journal*, *Astronomy and Astrophysics*, and the *Monthly Notices* scanned. We are in the process of scanning 20 years of *Astronomy and Astrophysics*, *ApJ*, *Monthly Notices of the Royal Astronomical Society*, and several smaller journals.

I plan to scan all these journals back to volume 1 eventually. I already have several of the journals in hand for scanning. We will proceed with the scanning throughout the coming year.

In order to further improve the ADS, I would like to ask for your help. If you are the editor of any conference proceedings, please consider collecting the abstracts for your proceedings volume and sending them to us. We will index them into the ADS so they will be available for searching. If you know a proceedings editor, please ask him or her to contact me about including their abstracts in the ADS. Even a table of contents for the proceedings volume will be valuable for us to include.

We are missing some journals. I am looking for somebody who can donate the missing volumes to us for scanning. A list of missing volumes is available at:
http://adswww.harvard.edu/pubs/missing_journals.html

Lastly, if you are associated with a journal that is not in our system, and you would like your journal to be scanned and made available on-line, please contact me.

There is a demonstration of the ADS set up next to the E-mail terminals. Please stop by and have a look at how it works.

GUENTHER EICHHORN
ADS, Smithsonian Astrophysical Observatory

Thickness of Saturn's Rings

One of the most significant parameters of the Saturnian ring system is their thickness. The first quantitative estimates of the thickness were made in 1966, during a transition of the Earth through the plane of the rings. Using photographic photometry, Kiladze, Focas and Dollfus determined thicknesses of 1.4 to 2.8 km. A measure by Brahic *et al.* during the 1980 transition yielded 1.4 km. In 1981, Voyager 2 estimated a much thinner system, at 0.15 km.

During the 1995 transition, CCD observations of the rings were carried out by the authors using the prime focus of the 125 cm Ritchie-Chretien telescope of the Abastumani Astrophysical Telescope in Georgia. The CCD was part of a SBIG ST-6 camera, with a pixel array size of 375 x 242. The sampling was 0.3 arcsec per pixel, and typical exposure times were 10 to 60 seconds, using a standard B filter. The system was observed during twelve successful nights, in the period from 20 July until 27 August. On the night of 10/11 August, the moment of transition occurred.

Preliminary data reduction has yielded the exact moment of transition to be 01h 03m +/- 10 m (local time) on 11 August, 1995. The measured thicknesses were 4 km (C ring), 6 km (B ring), 4 km (A ring) and 3 km (F ring), with an rms error of 0.5 km. Had we been missing the observation of 10/11 August, the mean value of the measured thickness would have been 1.3 km, in accord with earlier measures.

R.I. KILADZE,
T.M. KVERNADZE,
M. GIKOSHVILI
Abastumani Astrophysical Observatory

No, not another Kyoto shrine, and no, not a set for a sci-fi movie. This is the KICH, reproduced here as a guide for those attendees who get easily lost.

Sidereal Times

Some Things Just Naturally Oscillate

Just as we have come to understand much about the structure of the Earth from seismology, we understand much of the outer structure of the Sun from the *helio*seismology of its five-minute oscillations. In the case of the Sun, the restoring force is the acoustic gas pressure. The Sun's "ringing" is the result of hundreds of superimposed oscillations, each of which divide the Sun into a criss-cross of regions going up, down and sideways.

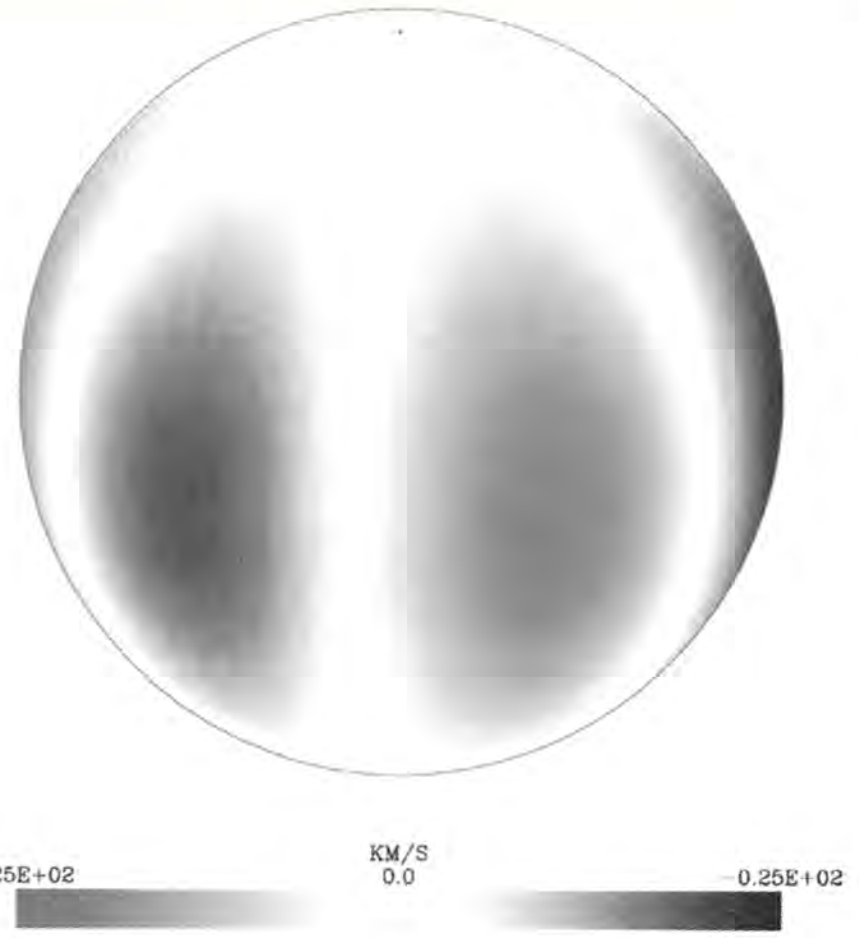
To probe deeper into the Sun, we also seek the lower-order spherical harmonics, which might only slice the Sun into halves or quarters. These would have much longer periods. Here the gravity of the whole star is the restoring force.

While G-type stars have not yet been proven to exhibit these non-radial gravity-mode oscillations, some early F-type stars do show this behavior. The prototype is Gamma Doradus, discovered by Alan Cousins in the 1960s to be variable by a few hundredths of a magnitude. From a 1994 multi-longitude spectral and photometric campaign, Luis Balona and colleagues were able to model Gamma Doradus (see figure) as a three-mode, non-radial g-mode pulsator. We now know of nearly two dozen stars that show similar photometric behavior. On the basis of radial velocities and line profile data, two of them (9 Aurigae and HD 164615) have also been proven to pulsate like Gamma Doradus.

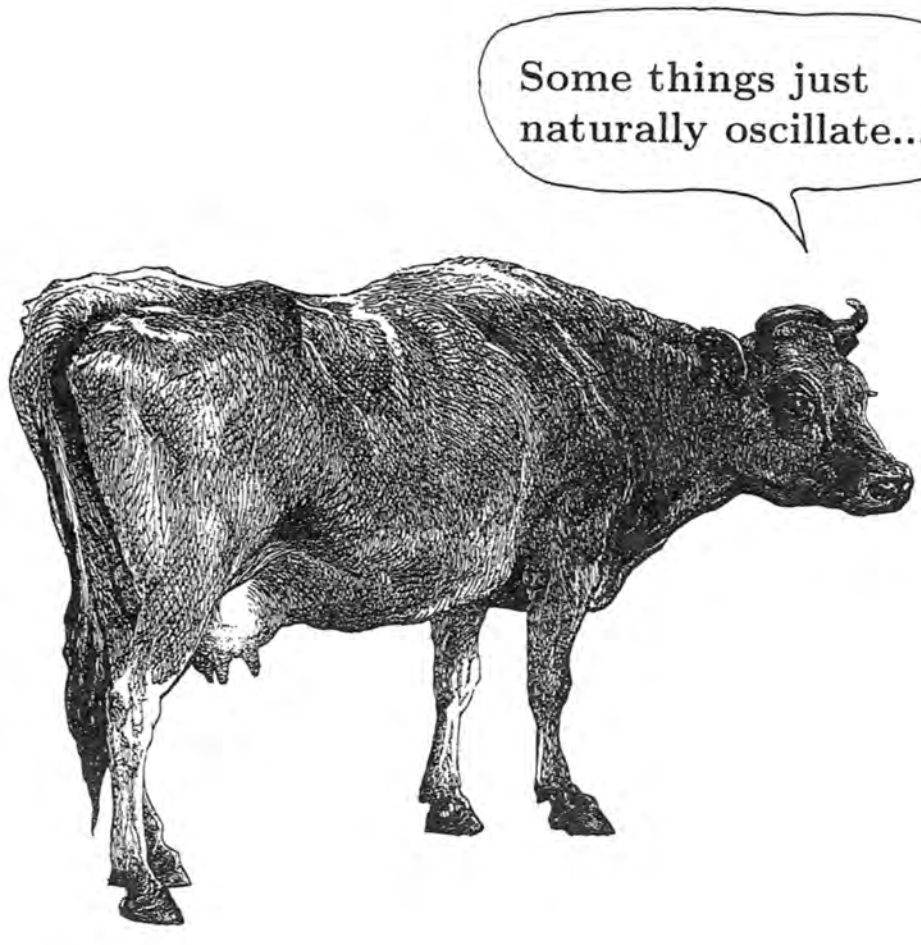
As the spectral line shapes of such a star vary like a cow's udders, swinging back and forth, the second figure reminds us that some things just naturally oscillate.

The most controversial question that Gamma Doradus-type stars raise is this: are the radial velocity variations of stars like 51 Pegasi due to the tug of an orbiting planet, or are they instead the result of non-radial oscillations? If 51 Peg-type stars (with very regular radial velocity changes having periods of a few days) show line profile and photometric variations like a scaled-down version of a Gamma Doradus star, we will have "lost" a few planets. Or, as the universe is often more curious than we could have predicted, perhaps the close proximity of a planet around a solar-type star can induce the much-sought gravity mode pulsations, increasing the likelihood that we will find them in the Sun itself.

KEVIN KRISCIUNAS
University of Washington



Flux amplitude model of the non-radial pulsations of Gamma Doradus. Courtesy of Conny Aerts.



Bovine analog of line profile variations in low-order, non-radial pulsator.

Kanji Characters to be Abandoned

The famous Kanji pictograms have got to go. This was the startling conclusion reached last week by the Japanese Association of Keyboard Designers, and the government has concurred. Within two months, Kanji text will be removed from billboards, advertising signs, and subway maps. Henceforth, all written Japanese will appear in the Cyrillic alphabet. In addition, every Japanese citizen under the age of 85 will be required to return to grammar school.

Special Session on Comet Hale-Bopp

Saturday, 23 August

First Session, 1400-1530

1400: SPS3-001T
Overview of the Development of Hale-Bopp's Activity
K.J. Meech

1420: SPS3-002T
Infrared Observations of the Dust in Comet Hale-Bopp
T. Hayward

1435: SPS3-003T
Synchronic Bands in the Dust of Comet Hale-Bopp
J. Watanabe

1450: SPS3-004T
Ultraviolet Observations of Comet Hale-Bopp
P. Feldman

1510: SPS3-005T
Composition and Production Rates in Comet Hale-Bopp
M.F. A'Hearn

Second Session, 1600-1730

1600: SPS3-006T
Radio overview, title TBD
B.J. Butler, A. Wooten, J. Magnum, A.J. Beasley, P. Palmer, and D. Bockele-Morvan; presented by Butler.

1620: SPS3-007T
Nobayama paper, title TBD
S. Ukita

1635: SPS3-008T
European Campaign paper, title TBD
R.M. West and H. Boehnhardt; presented by West

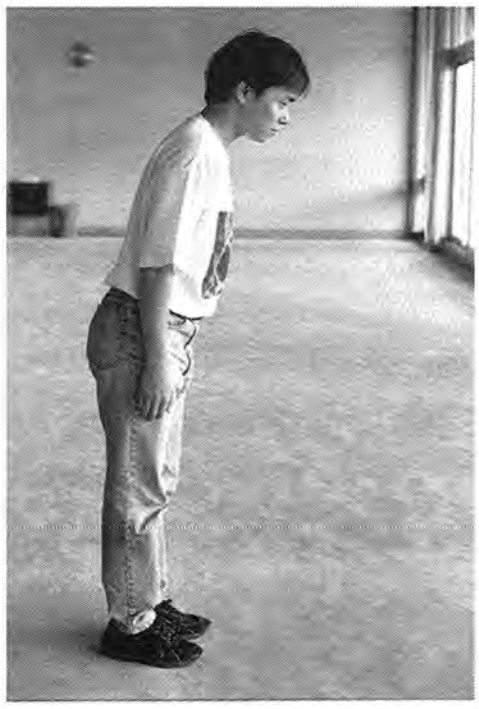
1655: SPS3-009T
Hale-Bopp Nucleus Thermal Evolution Model
M.T. Capria

1710: SPS3-010T
Implications of Interstellar Chemistry for Comets
P. Ehrenfreund

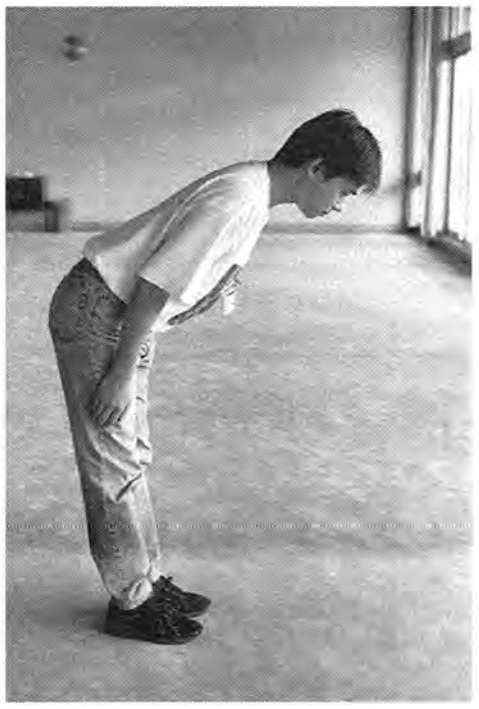
From the Past

The accompanying photo was made in the summer of1951 by Patrick Wayman, now of the Dublin Institute for Advanced Studies. He took this shot outside the van Biesbroeck residence at Yerkes Observatory, and it includes several personages of interest to the astronomical community.

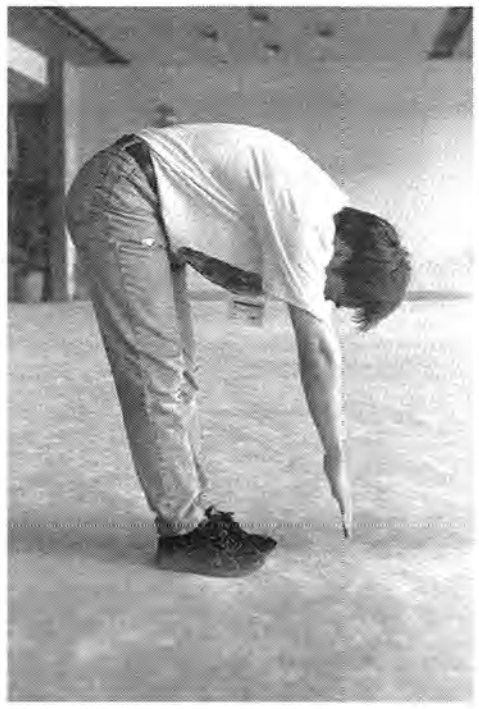
In the center, from left to right, are Larry Helfer, Su-shu Huang, Nancy Roman, Yoshio Fujita, and Paul Ledoux. Behind them are Bruce Stephenson, Hugh Johnson, Stuart Sharpless and Wallace Beardsley. In the last row are Mrs. van Biesbroeck and Dr. van Biesbroeck, and to the right is Y. Ahmed of Egypt. Patrick Wayman is at the extreme left of the photo. The other people appearing in the picture are members of the van Biesbroeck family, including Mies van Biesbroeck, a librarian, in front.



Hiro Wakano demonstrates a standard bow, suitable for most social occasions.



A deeper bow is reserved for the boss, your mother-in-law, or your parole officer.



Too deep a bow will brand you as socially inept, and may cause you to lose your ballpoint pens.

The thought of a 'caffeine fix' draws early morning crowds to the Exhibit Hall. Behind them lurks the poster labyrinth.

Light on Local Customs

Despite the tepid response to our earlier piece on Japanese table manners, we continue our scrutiny of another inscrutible Oriental custom, that of bowing.

Most GA attendees from the West will greet one another by shaking hands. This barbaric practice apparently dates back thousands of years, and developed because one could not shake a fellow barbarian's hand and simultaneously lop off his head with a sword. The gesture enforced a peaceful encounter.

Nonetheless, shaking hands has many disadvantages. It demands a modicum of physical contact, making it awkward for those of opposite sex, and is possibly biologically dangerous as well. A recent *Nature* article has described research on white rats and fruit flies that implicates hand shaking in the spread of 13 rare diseases of the palm.

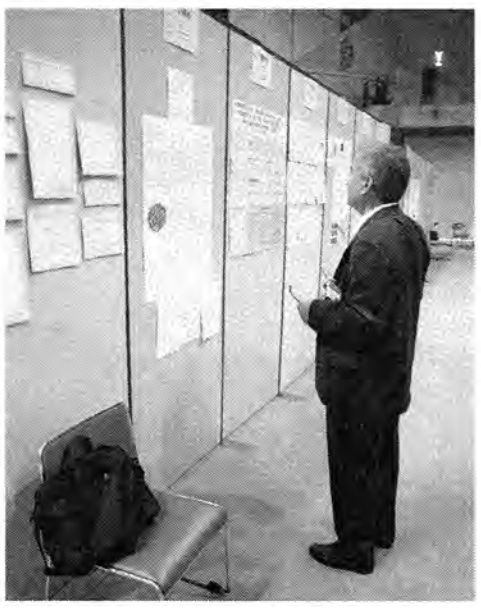
Bowing suffers none of these problems, although over-enthusiastic bowing by two people standing less than 0.4 m apart has occasionally caused brain concussions. How many times do you have to bow? IAU authorities assure the author that one bow is enough. You will often see Japanese engaged in fits of repeated bowing however, because it is considered impolite to stop before the other person has. This can lead to an 'infinite loop' situation of course, and there are rumors of two Tokyo businessmen who have been continuously bowing since 1964. Their wives have re-married.

How deep should a bow be? The deeper the bow, the more respect conveyed. There are limits, however. If you hear noises emanating from your spine, or spill the contents of your shirt pocket onto the carpet while bowing, you've probably gone too far.

In order to better acculture yourself to the Japanese lifestyle, the author recommends that you practice bowing in the privacy of your hotel room. Once you've mastered the basics, try bowing at random folk on the street or in the subways, or at the very least bowing to phone poles and dogs. Eventually, you'll be bowing with the best of them. It's doubtful you'll ever go back to grabbing someone's sweaty palm just to avoid having your head lopped off.

SETH SHOSTAK

Barbaric western gesture.



Reading results is quicker than listening to the author expound, and may explain the relative popularity of this new publication form.

No Significance

Consultations with the Faculty of Cultural History at Yohokokawanake University have confirmed that there is no significance to the fact that Kyoto and Tokyo, both capitals of Japan, happen to be anagrams in English. Many attendees at this conference had thought otherwise.

The Sidereal Times

Kyoto IAU23

IAU XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.5: Friday, 22 August

How Long Since the Big Bang, Really?

Although simple in practice, the measurement of an accurate value for the Hubble constant has been elusive for decades. Why is this so? Measuring the recession velocities for galaxies is no problem; however, the historical record shows all too clearly that measuring the distances to galaxies is a notoriously difficult task and that careful attention must be paid to systematic uncertainties.

Wendy Freedman expands on the oxymoronically-named Hubble constant.

The HST Key Project is a multi-nation effort to address this problem involving astronomers across the US, as well as members from Canada, Great Britain, and Australia. Led by principal investigators W. Freedman (Carnegie Observatories, Pasadena), J. Mould (Mount Stromlo and Siding Springs), and R. Kennicutt (Steward Observatory), this group of 27 astronomers is using the HST to discover Cepheid variables and measure accurate distances to galaxies in the local universe (3-20 Mpc).

Given the historical difficulties in measuring H_0, the underlying philosophy of the Key Project has been to avoid "putting all of our eggs in one basket." There are three aspects to the project. The primary emphasis is on the calibration of a number of independent, secondary distance indicators. These include Type Ia supernovae (also being studied by A. Sandage, G. Tammann, and collaborators), Type II supernovae, and the Tully-Fisher relation, for example. The second goal of the program is to test for systematic errors (both in the secondary methods as well as in the primary Cepheid scale). Finally, Cepheid distances to several galaxies in the Virgo and Fornax clusters are being obtained. Although the proximity of these clusters precludes a determination of H_0 to better than 15-20%, these clusters provide a valuable consistency check both on H_0 and the calibration of secondary methods.

At the time of the last IAU in the Netherlands in 1994, our group had just discovered the first Cepheids in the Virgo spiral galaxy, M100. Since that time, distances to a dozen galaxies distributed both in the field and nearby clusters, have been measured. Based on a calibration of Type Ia supernovae, Type II supernovae, the Tully-Fisher relation for spiral galaxies, the D_n-sigma relation for elliptical galaxies, in addition to a local Cepheid calibration, a mean value of $H_0=73\pm6$ (statistical) $\pm$ 8 (systematic) km/sec/Mpc is currently obtained. One of the interesting results to emerge is the excellent agreement amongst a wide range of different methods and different groups, and the convergence of H_0 values between 65-85. This value implies an expansion age of 9 Gyr for a critical density universe, and 12 Gyr for a low-density universe.

What remains to be done in the project? In the next year, our HST observations will be completed, and for several secondary methods the numbers of Cepheid calibrators will be doubled. Two additional Virgo and Fornax cluster galaxies will be measured. We are also

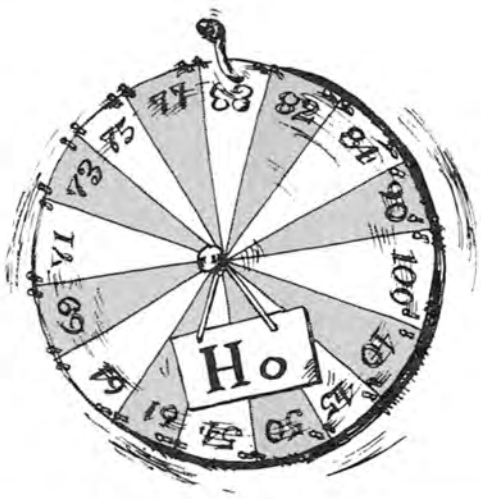


Illustration: Kazuhiro Matsuyama

completing an extensive series of checks on our own photometry, as well as that of other groups using HST to measure Cepheids. While the last word on H_0 is certainly not yet in, the agreement based on a large number of techniques using both ground-based telescopes and HST, undertaken by many independent groups, plus the wealth of data still being mined from the Key Project all yield numerous reasons for optimism that convergence on H_0 is now finally within sight. Our results to date indicate that by the end of the Key Project, we will have achieved our goal of measuring H_0 to an accuracy of 10% (before the next General Assembly of the IAU in the year 2000).

WENDY FREEDMAN
Carnegie Observatories

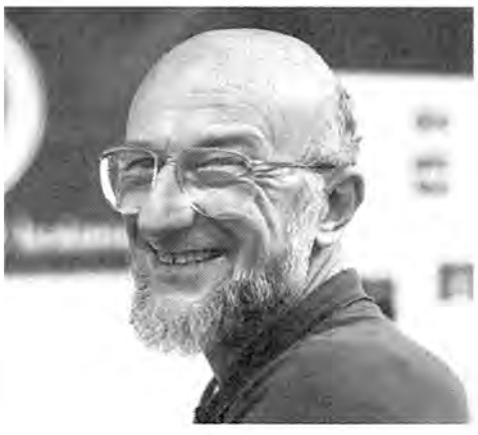
Amateurs Embrace the Digital Sky

"Heaven on Earth" and "A dream come true" are just two of the comments written by reviewers of RealSky CD, the Palomar Observatory Sky Survey on 9 CD-ROMs. In recent years, amateur astronomers have been increasingly involved in serious research endeavors in cooperation with professionals. Computer-controlled telescopes, cooled CCD cameras, and sophisticated image processing software are modern tools that have all enhanced the power of amateurs to make serious contributions to research. Now, they also have a digital map of the real sky.

Easy access to deep photographic sky surveys has been taken for granted by professionals for the last 40 years. Three years ago, the blue plates of the Palomar Sky Survey in digital form on 102 CD-ROMs were distributed to over 400 major observatories and institutions worldwide. The data, compressed by a factor of 10x, are virtually indistinguishable from the original POSS glass plates. Not satisfied with a good thing, the original data were compressed by a factor of 100x, and made available on only 9 CD-ROMs, readable on home computers and affordable by all . Produced and distributed by Space Telescope Science Institute and the Astronomical Society of the Pacific (ASP), RealSky CD is finding its way into the homes of an increasingly large number of amateurs, and into schools and small professional observatories worldwide. Reception has been universally and overwhelming positive. This September, with the support of PPARC and the AAO, data from the southern hemisphere UK Schmidt Survey will be available as RealSky-South. These data will also be distributed by the ASP. For more information on ASP offerings, check out www.aspsky.org.

The challenge to astronomers everywhere is to assist amateurs and educators in every possible way to make full use of the new tools that have been made available. The ASP is developing a number of exercises that employ RealSky CD for secondary-school teachers. The AAVSO and the IAPPP are assisting amateurs with serious research projects. Other groups of many nations are doing the same.

BOB HAVLEN
Astronomical Society of the Pacific



Distribution of Dark Matter in Spiral Galaxies

The orbital velocity at some radius gives us a pretty good estimate of the total mass in a galaxy interior to that radius, but it is much harder to tell how much mass is in the luminous matter and how much in the dark matter (DM). There is generally no feature in the rotation curve to indicate where the dominant component might switch from luminous to dark matter. But now three recent thesis projects at Rutgers University all seem to suggest that DM has a very low central density in the bright inner parts of galaxies.

Palunas has I band surface photometry and 2-D kinematic maps of 76 southern disk galaxies. Assuming a constant M/L for the disk and bulge in each case, and calculating the gravitational field, he finds that the shape of the inner rotation curve is very well reproduced by the light distribution for I-band mass-to-light ratios of about 2 or 3 in most cases.

Weiner models the 2-D kinematic map of the barred galaxy NGC 4123 by calculating the gas flow in a potential model derived from the I-band photometry. He finds that almost all the mass in the inner galaxy must be in the luminous component, else the non-axisymmetric distortions of the velocity field are not strong enough.

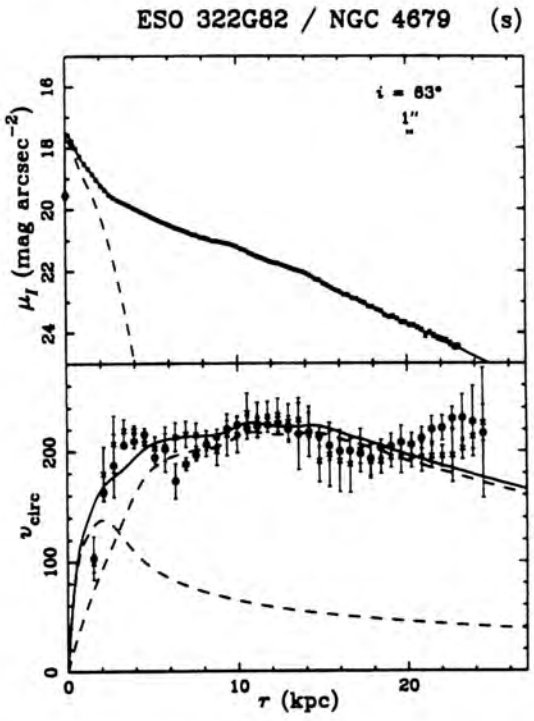
Debattista uses fully self-consistent simulations of barred disks embedded in halos to find that bars rotating in massive halos lose angular momentum through dynamical friction, as predicted by Weinberg. When the halo has even a moderate central density, the bar quickly slows to pattern speeds too low to be consistent with observed galaxies. Only if the halo density is so low that the inner rotation curve is dominated by the disk component can the rapid braking be avoided.

All three of these projects, as well as mass models for the Milky Way, lead to the conclusion that DM halos have low central densities and large core radii in bright galaxies.

This conclusion contrasts strongly with the results from cosmological N-body simulations which suggest that the DM distribution is strongly peaked as a power law in density into the center. It is not yet clear how this discrepancy between large-scale structure simulations and the observed properties of galaxies will be resolved.

JERRY SELLWOOD
Rutgers University

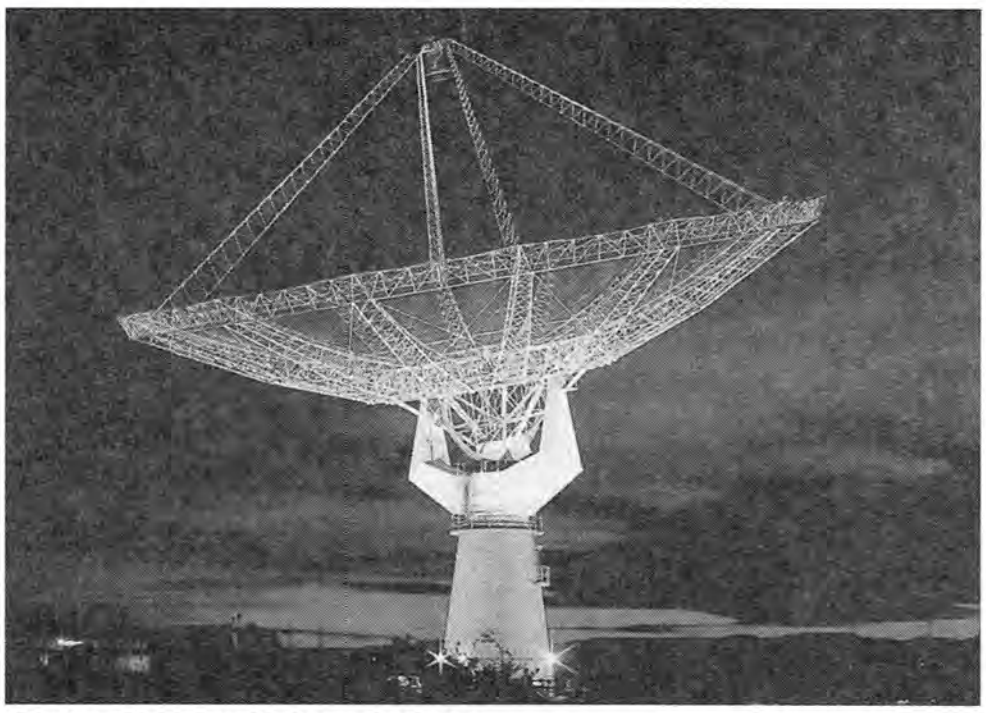
PALUNAS & WILLIAMS (1997)



M/L of disk & bulge separately assumed constant

Forces from the disk (assumed razor thin) and spheroidal bulge calculated exactly

Mass discrepancy only near outer edge



The first 45 m parabolic dish of the GMRT.

Update on the Giant Meter-wave Radio Telescope

India is presently celebrating 50 years of independence. An important scientific milestone that will be part of the celebrations is the opening of the world's most powerful radio telescope operating at meter wavelengths, the Giant Meter-wave Radio Telescope (GMRT). Now in its final stages of completion, the GMRT consists of 30 fully-steerable parabolic dishes, each 45 m in diameter, located on a site about 90 km north of the city of Pune. It is being built by the National Centre for Radio Astrophysics, which is a part of the well-known Tata Institute of Fundamental Research.

The several unique features of the GMRT will enable Indian radio astronomers to study a variety of important astrophysical problems in galactic and extragalactic astronomy that lend themselves to investigation at meter wavelengths. Perhaps the most important among these are studies of pulsars and the search for protogalaxies and proto-clusters through the detection of the highly-redshifted radio line from atomic hydrogen (21 cm radiation).

There are several important reasons why Govind Swarup and his colleagues, who first conceived the GMRT over 10 years ago, chose to work in the meter-wave part of the spectrum, not least of which was their considerable experience and expertise in building and operating a large cylindrical radio telescope (the Ooty Radio Telescope) at 327 MHz in South India for over 25 years. The meter-wave region remains largely unexploited in the developed world, probably because of the very high levels of radio interference prevalent there.

Another important factor in the choice of frequencies was the possibility of a substantial reduction in the cost of the paraboloids at longer wavelengths, which led Indian scientists and engineers to develop a novel structural design. Designated SMART, for Stretched Mesh Attached to Rope Trusses, the reflecting surface of the dish is formed by stretching a stainless steel wire mesh over a series of plane facets formed with the help of stainless steel wire rope trusses. The size of the mesh (made of 0.5 mm diameter wires) varies from 10 mm x 10 mm to 20 mm x 20 mm, constituting an effective solidity of about 7%. The resulting reduction in wind forces on the structure has made it possible to limit the weight of a 45 m dish to just about 80 tons, with a concommitant reduction in cost. Note that this design is particularly suitable for India, where it never snows in the plains. It would not work in Japan, Europe or North America.

All 30 dishes of the GMRT have been erected, and most are fitted with electronics. The first phase of the digital correlator system is operational for up to 8 antennas, and is being used to make astronomical observations with the central, compact array of 12 telescopes, more or less arranged in the shape of a 'Y'. The final system for correlating all 30 dishes will be operational in the next few months.

V.K. KAPAHI
Tata Institute of Fundamental Research, Pune

Antarctic Astronomy is Cool

While IAU participants enjoy sunny Kyoto weather at temperatures in excess of 300 K, astronomers at the South Pole are gathering data through the six-month Antarctic night at ambient temperatures of 190 K. Since the last IAU General Assembly, an observatory has been established at Amundsen-Scott South Pole Station by the Center for Astrophysical Research in Antarctica (CARA), a U.S. National Science Foundation Science and Technology Center. Astronomers have been drawn to the Pole by excellent observing conditions: the extreme cold dessicates the atmosphere and reduces the thermal background, providing unsurpassed observing conditions at wavelengths between 1 mm and 2 microns. The Antarctic plateau also has surprisingly low peak wind speeds.

Two telescopes are currently operational at the South Pole. SPIREX, the South Pole InfraRed EXplorer, is a 0.6 m diameter telescope which operates in the near IR, this year in the "K dark" window at 2.3 microns and next year at 3 microns. AST/RO, the Antarctic Submillimeter Telescope and Remote Observatory, is a 1.7 m diameter instrument for heterodyne spectroscopy and photometery at wavelengths near 600 microns. Results from AST/RO were presented at IAU Symposium 184.

Antony Stark

A cosmic microwave background telescope, Python, was operational during the summer and detected anisotropies at 1 degree spatial scales. Two new cosmic background telescopes, VIPER and DASI, will be fielded in the coming seasons.

Both AST/RO and SPIREX are available to all astronomers on a proposal basis. The observations are carried out by remote observing.

Results from the current small telescopes have demonstrated the superb qualities of the site, and plans are underway for major instruments constituting an International Antarctic Observatory. A10 m diameter offset submillimeter-wave telescope has been proposed by an international consortium. The consortium is still open to partners interested in contributing to this effort.

This telescope will be capable of detecting both the line and continuum radiation from z=3 protogalaxies in an hour, and can make high frequency (180 GHz) small scale (0.1 degree) measurements of the Zel'dovich-Sunyaev effect from clusters of galaxies throughout the universe. Plans have also begun for a 2 to 3 meter diameter, near-infrared telescope.

Results and future plans will be discussed at the Working Group for the Development of Antarctic Astronomy on Friday, 22 August at 14:00-17:30, room J.

ANTONY STARK
Smithsonian Astrophysical Observatory

The Antarctic Submillimeter Telescope and Remote Observatory atop its building at the South Pole in February, 1997. The main part of the Amundsen-Scott South Pole Station lies beneath the dome, which is about 1 km distant. An LC130 cargo aircraft is parked on the skiway. (photo credit: A. Lane)

Japanese Dancing Girls

The accompanying photos show the hairstyles and dress worn by *maiko*, young dancing girls that you might chance to see in the Pontocho area, down by the river. Of particular note are the *wareshinobu* hairstyle, with its special comb *(kushi)* and ornamental pin *(hana-kanzashi)*, the long-sleeved *kimono*, and the specialized makeup. The last often consists of white powder applied to face and neck, and bright red lipstick. The girls are young, typically between 10 and 20 years.

The *maiko* tradition is three centuries old, and harks back to a time when waitresses in restaurants would improvise their own *kabuki* imitations for the amusement of the customers. You can see today's *maiko* performing at Gion Corner, which is on the east side of the river, and only a short walk from downtown.

Mt. Fuji To Be Removed

Japan's highest peak is suffering. The perfectly-shaped volcanic cone is threatened with asymmetry due to uneven erosion by rains. In addition, the continuous rumble from the nearby *Shinkansen* rail line is causing rock slides from Fuji's southern flank.

In order to protect this famous hunk of cold lava from further deterioration, the Tokyo Topographic Society has recommended removing the mountain and placing it indoors. Last week, the Japanese Diet reacted positively to this recommendation; as a consequence, Fujiyama will soon be housed in a very large geodesic dome on the island of Okinawa. Those who fear that relocation may be detrimental to the 3,800 m volcano have been reassured by the government. They point out that Fuji will be cut into 10 cm cubes, each of which will be labeled, shipped to Okinawa, and reassembled. A selected team of 10 people will spend three months on this important project. An alternative plan to put Mt. Fuji under a canvas tent in downtown Tokyo was rejected due to high real estate costs.

Once the famous berg has been removed, a golf course will be constructed in its place.

Glow Grows Grisly

The increasing problem of sky glow in Japan and Korea

IAU Commission 50 deals with the problems of light pollution, radio interference, and space debris. It has recently tackled the additional problems of atmospheric dust, lunar protection, and interplanetary space protection.

Of these problems, light pollution is particularly aggravating. In the figures, you can see the nighttime brightness distributions in Japan and Korea as measured by the US DMSP satellite at 10 pm on January 20, 1993 and 1996. These data were reduced by Syuzo Isobe and Shiomi Hamamura at the National Astronomical Observatory of Japan. One can see a marked increase in brightness both in Japan and Korea, a three-year growth in sky glow that is most likely caused by economic development. With their high population densities and small size, it is very difficult to find any places in these countries that are farther than 100 km from the nearest big cities. Both the CIE and IAU Commission 50 are jointly working to make a resolution to set guidelines for minimizing sky glow. These would encourage zoning, and recommend that the sky glow level should be an order of magnitude less bright than the natural sky background in areas that are farther than 100 km from big cities. Unfortunately, there are practically no areas either in Japan or the southern part of Korea that conform to these CIE/IAU requests.

In order to address these difficulties, optical astronomers should work hard to make the public aware of the problem, and to encourage their support. This is not altogether easy, for although astronomers suffer from sky glow, we are a minority. The majority public feels more positively about nighttime illumination, finding it useful or perhaps even beautiful. In some ways a similar situation obtains for radio interference and space debris.

To consider these matters, we are holding a Joint Discussion at this Assembly, JD5, "Preserving Astronomical Windows" and will propose three resolutions in Category B. We hope you will attend JD5 and support the resolutions.

SYUZO ISOBE
President, Commission 50

Nighttime illumination over Japan and Korea in 1993, as measured by the American DMSP satellite.

Same, but 1996. Squid boats account for the bright band between Japan and Korea.

Accent on Acronyms

DID YOU KNOW that acronyms exist even in kanji Japanese? Lengthy phrases are shortened by using a few, representative kanji characters.

ADDING AN ACRONYM

What do the acronyms LCRS, ICRF, NVSS, and FIRST have in common?

These acronyms have all been "pre-registered" in the new, experimental, voluntary IAU "Registry of New Acronyms" which is available on the WWW at URL: http://cdsweb.u-strasbg.fr/cgi-bin/Dic-Form.

The "Registry" is maintained by the CDS for the TG on Designations. Registering the acronym insures the availability of a suitable, unique acronym for a large survey and that the proposed designation conforms to the IAU recommendations.

H.R. DICKEL
Chair, IAU Task Group on Designations

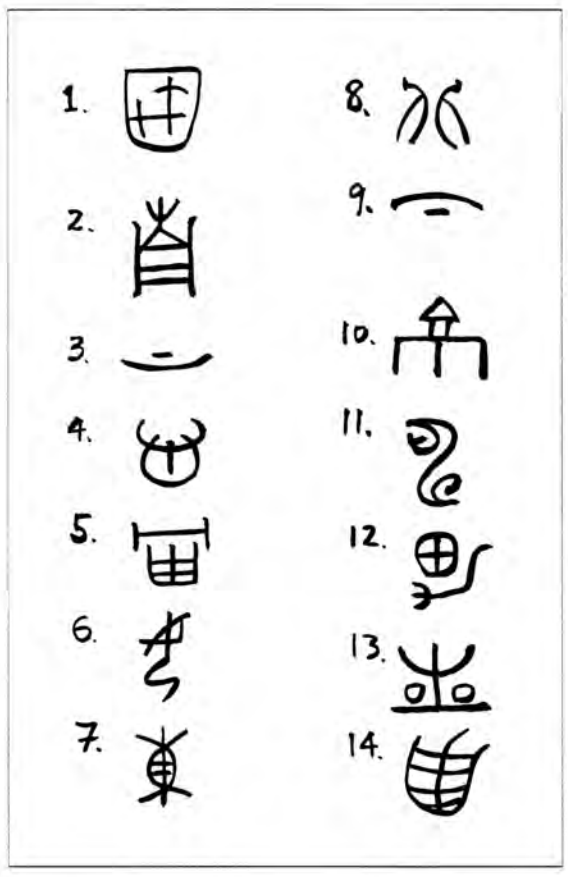
Subways Back in their Tubes

Many conference attendees have reacted with confusion over an earlier announcement that, beginning immediately, all Kyoto subways will be operating above ground. The editors would like to point out that this was a joke. The subways will not be operating above ground. The lack of tracks would make this awkward. Additionally, subway drivers, who are selected for exceptional night vision, would be blinded if forced to work in sunlight. To repeat, the subways will stay in their tubes. However, we bring to your attention the fact that, as of this weekend, all bus service will be subterranean.

KANJI: Can you find the answer?

Connect the kanji and corresponding pictographs.

a. 京=kyo (capital)
b. 男=otoko (man)
c. 女=onna (woman)
d. 心=kokoro (heart)
e. 神=kami (god)
f. 星=hoshi (star)
g. 宇=u (space)
h. 宙=chu-u (time)
i. 東=higashi (east)
j. 西=nishi (west)
k. 南=minami (south)
l. 北=kita (north)
m. 上=ue (on, above, upper, up...)
n. 下=shita (under, below, lower, down...)



Notice for Commissions 10, 12 and 49

The joint business meeting of Commissions 10, 12 and 49 (Division II) on Saturday, 23 August, is shifted to room K, and will take place between 11:00 and 12:30.

ODDBJORN ENGVOLD
President, Division II

Answers "Kanji" (*page 4*)
a-10, b-12, c-6, d-4, e-11, f-13, g-1, h-5, i-7, j-14, k-2, l-8, m-3, n-9

The Sidereal Times

Kyoto IAU 23

IAU XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

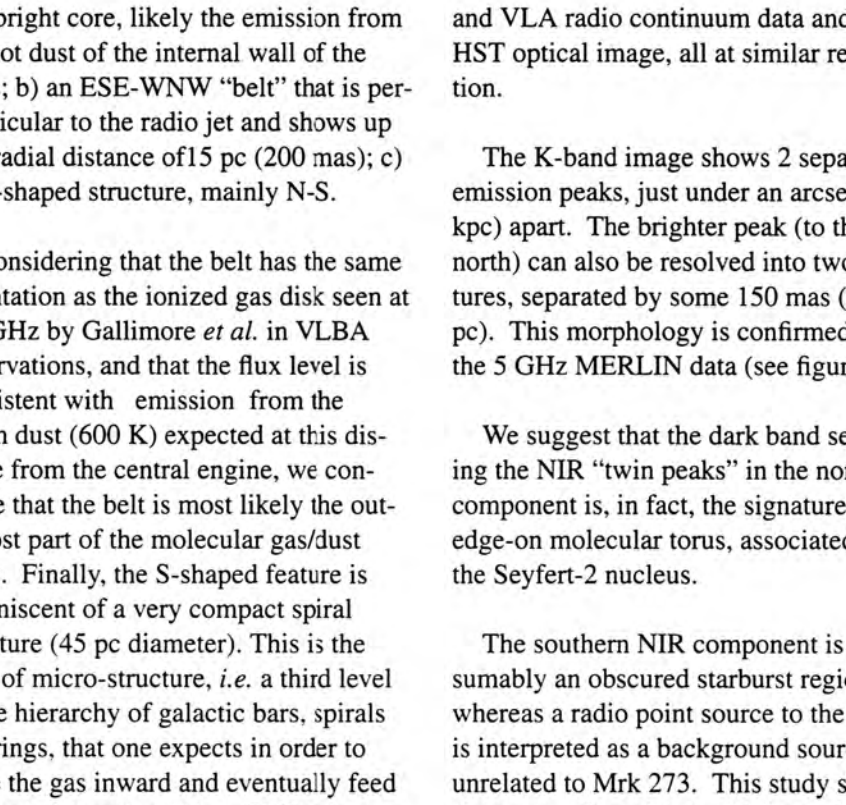
No.6: Saturday, 23 August

Adaptive Optics Works

PUEO is the name of an Hawaiian owl with very sharp nighttime vision. This is also the name of the CFHT (Canada-France-Hawaii Telescope) Adaptive Optics (AO) bonnette, an instrument which shares the owl's exceptional eyesight. Developed as a collaborative effort by CFHT, Dominion Observatory, Observatoire de Paris and Sté CILAS, the bonnette, a common-user facility, was installed at the f/8 Cassegrain focus in March, 1996 and provided a fully-corrected image a few minutes after acquiring its first target. The AO system, based on the "all curvature" concept by F. Roddier, includes a 19-zone CILAS bimorph mirror coupled to a tip-tilt mirror, and a curvature wavefront sensor. PUEO shows unprecedented performance in correcting on very faint reference sources (m_R = 14-17 for full correction and low-order correction, respectively). At 2.2 microns, the typical FWHM is 0.13 arcsec, i.e. practically diffraction-limited. PUEO has so far fed MONICA, a Nicmos3-based, near-IR (NIR) camera from the University of Montreal, but will soon be equipped with a 1,000 x 1,000 pixel camera.

At Symposium 184, several extragalactic PUEO results were presented, two of which are described below.

Considerable effort has been expended during the last few years in making high angular resolution images of the nucleus of NGC1068 in the spectral range from UV to radio. Indeed, this, the closest (15 Mpc) Seyfert 2 nucleus, deserves such effort as it is a key object for firmly establishing the unified model of AGN. This model postulates a thick parsec-scale torus of dust and molecular gas around a central engine. There is now clear evidence of a torus in the radio domain, however direct images of the torus itself are still lacking in the IR-visible. Our group at the Observatoire de Paris, in collaboration with Canadian astronomers, recently obtained, using PUEO, near-infrared diffraction-limited images of NGC1068, and these data will soon be submitted for publication. Figure 1 shows the [H-K] image of the central 3x3 arcsec². One clearly sees:



Grey-coded [H-K] image + isophotes of the 3x3 arcsec² nuclear region of NGC1068. A log (magnitude) scale is used. These images were obtained using PUEO, the CFHT Adaptive Optics bonnette. The ESE-WNW belt probably traces the outer part (15 pc) of the dust/molecular torus postulated by the Unified Model of AGN, while the S-shaped structure (N-S) could be the micro-bar/spiral structure (45 pc diam.) that has been predicted in order to drive the gas inward.

a) a bright core, likely the emission from the hot dust of the internal wall of the torus; b) an ESE-WNW "belt" that is perpendicular to the radio jet and shows up at a radial distance of15 pc (200 mas); c) an S-shaped structure, mainly N-S.

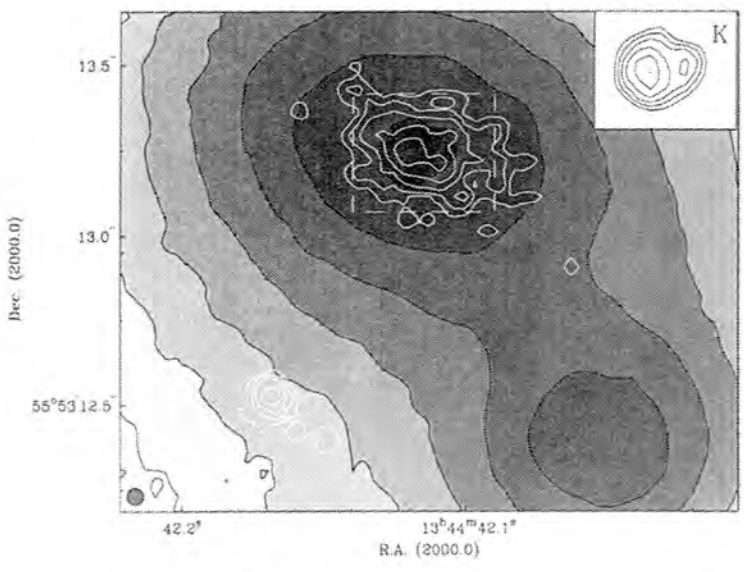
Considering that the belt has the same orientation as the ionized gas disk seen at 8.4 GHz by Gallimore *et al.* in VLBA observations, and that the flux level is consistent with emission from the warm dust (600 K) expected at this distance from the central engine, we conclude that the belt is most likely the outermost part of the molecular gas/dust torus. Finally, the S-shaped feature is reminiscent of a very compact spiral structure (45 pc diameter). This is the kind of micro-structure, *i.e.* a third level in the hierarchy of galactic bars, spirals and rings, that one expects in order to drive the gas inward and eventually feed the central massive object (F. Combes, Symp. 184).

A team of British and Canadian astronomers used PUEO to obtain a 120 mas resolution K-band image of the ultraluminous infrared galaxy Mrk 273, and combined that image with MERLIN and VLA radio continuum data and an HST optical image, all at similar resolution.

The K-band image shows 2 separate emission peaks, just under an arcsec (0.7 kpc) apart. The brighter peak (to the north) can also be resolved into two features, separated by some 150 mas (~100 pc). This morphology is confirmed by the 5 GHz MERLIN data (see figure).

We suggest that the dark band separating the NIR "twin peaks" in the northern component is, in fact, the signature of an edge-on molecular torus, associated with the Seyfert-2 nucleus.

The southern NIR component is presumably an obscured starburst region, whereas a radio point source to the west is interpreted as a background source, unrelated to Mrk 273. This study shows the power of combining high-resolution multi-wavelength data.



The nuclear region of Mrk 273 at 2.2 microns (CFHT PUEO, grays and black contours) and in the radio continuum (MERLIN 5 GHz, white contours). Resolution is better than 150 mas. The inset shows the center of the northern component in K, at the same scale.

DANIEL ROUAN
Observatoire de Paris

JOHAN KNAPEN
University of Hertfordshire, U.K.

The Wide-Field Plate Database Project

The Wide-Field Database Project (WFPDB) contains descriptive information on astronomical wide-field (>1 degree) photographic observations now stored in archives world-wide. The WFPDB began as an initiative of the IAU Commission 9 Working Group on Wide-Field Imaging in 1991 (now the Working Group on Sky Surveys). When finished, it will provide on-line access to the information contained in about 2 million photographic, wide-field observations obtained since the end of the last century.

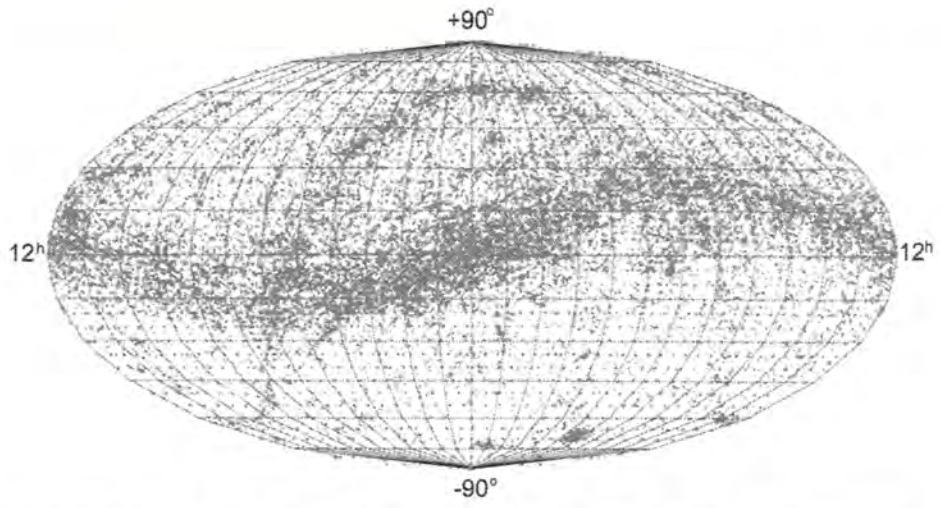
THe WFPDB is being compiled by the Wide-Field Plate Archives Research Centre (WFPARC), located on the campus of the Centre of Physics of the Bulgarian Academy of Sciences, in Sofia. At present, the WFPDB comprises data on more than 330,000 observations from 57 plate catalogs. Additional data from 120,000 observations from 32 plate catalogs are now being prepared for inclusion in the database.

The WFPDB provides information for each observation concerning the relevant archive, the parameters of the instrument and of the observation (position on the sky, time, object name, method, exposure time, emulsion type, filter, spectral band, plate size) as well as data concerning the plate quality, comments, and observers. Data concerning plate availability and digitization will be added to the WFPDB in the future.

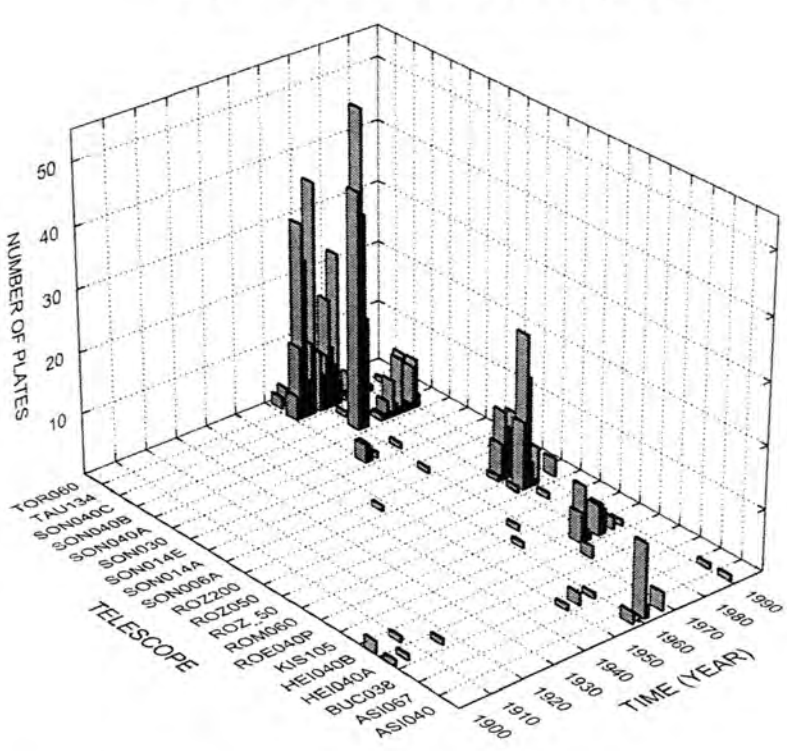
Ten issues of the list of wide-field archives have been published since 1991. The latest version (3.0) has information on 294 archives, containing more than 1,890,000 plates. Computer-readable index plate catalogs contain information about 500,000 plates. An additional 160,000 plates are listed in partially computer-readable form.

Additional information included in version 3.0 include the observatory identifier and E-mail addresses of the astronomers in charge of the archives. The list of archives can be down-loaded via the Internet at http://www.wfpa.acad.bg/. Recently, it has become possible to search the database via the CDS (Strasbourg) using VisieR at http://visier.u.strasb.fr/cgi-bin/VizieR?-source=WFPDB (VI/90/archives).

MILCHO TSVETKOV
Institute of Astronomy, Bulgaria Academy of Sciences



Distribution of wide-field plates. The plane of the ecliptic, in which comets and asteroids have been sought, is obvious.

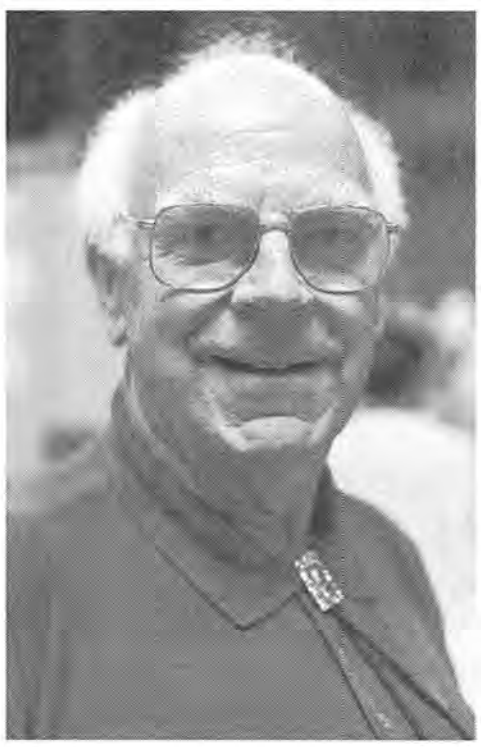


Results of a query for M31, showing data spanning a period of about 90 years.

Going to Bed with the Devil

Like so many countries these days, Australia is experiencing a severe downturn in government support for science. Sure, we could tighten our belts and live with less, if it were not for the countervailing ascent of pseudoscience — and even anti-science. Our universities are so cash-strapped that they are turning to more lucrative course offerings aimed, not at the pursuit of excellence as in the past, but at garnering the holy dollar from the least common denominator of intellect. To the shame of most academics (of any worth), we now have universities offering courses in naturopathy, homeopathy, iridology, acupuncture and other alternative medicines. Even chiropractors are becoming alarmed at the rise in competition!

Mainstream science subjects are declining while environment science, environmental engineering, and environmental management courses are flourishing. The students in these disciplines graduate all too often with no appreciation whatever of real science. For example, they are almost without exception zealous opponents of nuclear power while, in the same breath, bemoaning greenhouse gas emissions.



Non-university scientists are also unhappy. The Australian government decided against our astronomical participation in ESO. Our Near-Earth Asteroid survey (the only one in the southern hemisphere) was axed last year. Everyone's hurting, but I hope our astronomical institutions will not have to turn to teaching astrology to attract "clients" and balance their budgets.

Interestingly, one of the voices being raised against the flood of pseudoscience is from the Australian Skeptics, who are loosely affiliated with the North American CSICOP organization. The Skeptics are supporting a national science prize (for critical thinking), the new Exploratory Astronomy exhibition at Mt. Stromlo, and are right behind the voice of science in the infamous "Noah's Ark" trial recently held in Sydney. The judge found the creationist ark researcher guilty of fraud and misrepresentation, but the opposing scientist, Professor Ian Plimer, Head of the School of Earth Sciences at Melbourne University, lost the case because our Australian Trade Practices legislation was not breached. We always knew the law was flawed, but at least an appeal will be heard next month.

COLIN KEAY
University of Newcastle, NSW

No Referee!

That's right, the *Sidereal Times* uses no referees. You can pen pithy prose with abandon, knowing that you won't suffer the indignity of seeing your literary efforts sliced and diced by a jealous referee. The solicitous *Sidereal Times* editors are accomodating to a fault (indeed, we've accomodated many). So don't keep those hot new results to yourself. Write up a few hundred words on your laptop, on paper, or chisel them in stone tablets. Bring your deathless prose to room 552 where we will greet you with enthusiasm and reward your initiative with a coupon good for a free fish dinner in Reykjavik (transportation extra).

Don't Be Gauche!

Please be sure to deposit used coffee cups in the waste bins when in the Event Hall.

Starting from Zero

Astronomy in Bosnia and Herzegovina

As a result of terrible war, fortunately now behind us, the only astronomical observatory in this country has been totally destroyed. It was situated on a mountain close to Sarajevo, and was equipped with 0.6 and 0.4 m telescopes, as well as a small astrograph.

The main activities of the observatory were photoelectric photometry and astrophotography. It was also used by students and to popularize astronomy.

Now that the war is over, we are thinking about the future. Although it was possible to destroy instruments and buildings, the spirit of astronomy has survived. During the hostilities, a new general textbook on astronomy was written by the author, and this has now been published.

At the moment, there is not a single telescope larger than 60 mm aperture in Bosnia and Herzegovina. We are planning to establish a new observatory in the next few years. Help of any kind, including literature, instruments and even ideas, is more than welcome. Interested persons should contact the author via his mail box.

MUHAMED MUMINOVIC
Meteorological Institute, Bosnia and Herzegovina

The author stands amidst the ruined dome of the twin astrographs where thousands of plates were made.

At left is the 8 m dome where a 62 cm reflector once stood. To the right is the dome of a formerly operational 40 cm reflector.

Notes on the Kyoto Walking Tours

Remarks:
1) Detailed information is posted on the bulletin board.
2) Registration is accepted at the Information/LOC desk.
3) Last-minute registration may be accepted.
4) Tour meeting point is in front of the bulletin board.

August 25 (Monday), Morning (9:00-12:00)
A01. The site of Manshuin gate and Shisendo (Old Hermitage)
Fee 2,000 Yen {1,800 Yen for pass owner} includes Japanese tea, max. 10 persons
A03. The Yuzen Museum of Arts
Fee 1,100 Yen {500 Yen for pass owner}, max. 10 persons
A04. Shopping in Nishiki-koji Street and Teramachi-dori/Shin-Kyogoku-dori
Fee 600 Yen {free for pass owner}, max. 10 persons
A07-b. Kitano Tenmangu Fair (August 25 only)
Fee 800 Yen {free for pass owner}, max. 10 persons
A11. Daitokuji Temple and Imamiya Shrine
Fee 800 Yen {free for pass owner}, max. 10 persons

August 25 (Monday) afternoon (13:30-16:30)
B04. Shopping in Nishiki-koji Street and Teramachi-dori/Shin-Kyogoku-dori
Fee 600 Yen {free for pass owner}, max. 10 persons
B05. Shopping for authentic Kyoto folkcraft
Fee 600 Yen {free for pass owner}, max. 10 persons
B07-b. Kitano Tenmangu Fair (August 25 only)
Fee 800 Yen {free for pass owner}, max. 10 persons
B10. Kiyomizudera Temple and environs
Fee 1,000 Yen {300 Yen for pass owner}, max. 10 persons

August 25 (Monday) full day (9:00-16:30)
C-1. Ginkakuji and Nanzenji Temples
Fee 5,300 Yen {4,600 Yen} lunch included, max. 10 persons
C-2. Old Imperial Palace and Nijo Castle
Fee 2,700 Yen {2000 Yen}, max. 9 persons
C-3. Kiyomizu and Chion-in Temples
Fee 1,800 Yen {1,000 Yen}, max. 10 persons
C-4. Kinkakuji and Ryoanji
Fee 4,600 Yen {4,100 Yen}, max. 10 persons

Advice to Those Proposing IAU Symposia

We all like to organize symposia in our favorite fields, and one of the most important jobs of the IAU Executive Committee is to select from the proposals received those most worthy of support. When I served on the Executive, the authors of almost every proposal claimed that their proposals were "timely" and that everyone to whom they had spoken was enthusiastically in favor. (Of course, when preparing a proposal, we usually avoid talking to anyone who will NOT be enthusiastically in favor!) I once joked to my colleagues that, if we ever received a proposal whose authors frankly admitted that it was not timely, I would be inclined to vote for it on that ground alone!

Other common themes reflect the Executive's concerns that symposia be held in reasonably accessible places, where accomodation is not too expensive, with registration fees that are not too high, and, above all, that every qualified scientist be guaranteed admission to the host country. My experience has led me to develop a model symposium proposal which others might find helpful. Of course, I cannot speak for this or any future Executive, but I suspect that the approach of this proposal may be found refreshing.

Proposal for a Symposium devoted to a Critical Reassessment of Scientific Arguments in favor of a Geocentic Model of the Solar System

This proposal would not appear to be timely, since none of the colleagues to whom we have spoken has evinced any interest in the subject whatsoever. The presidents of several relevant commissions have been approached, but none, so far, have agreed to support our proposal. Some have not been bothered to answer our letters. In view of this complete lack of interest, it is difficult for us to sketch out even a preliminary program, but we remain convinced that a most unusual scientific meeting could be organized on this theme, if only we could find the right speakers. Among the problems to be discussed would be the merits of the equant, the minimum necessary number of epicycles, and the reality of trans-Saturnian planets that some observers claim to have detected.

We have found the ideal location for such a meeting — an uninhabited island in the South Pacific Ocean. Accommodation, being non-existent, is free of charge. The lagoon surrounding the atoll provides ample fish that participants may catch and cook for themselves. The milk from freshly-picked coconuts will provide refreshment during "coffee breaks." In view of this natural abundance, we can avoid charging any registration fee at all. The island is claimed by no country, so no participants will require a visa or, indeed, any identification other than that needed for re-admission to their home countries.

We must admit that access to the proposed location is not easy. The island being uninhabited, no major (or even minor) airline operates a regular service to it. This, however, is the only weak point that we can see in our proposal, and we confidently promise to all who make the effort to come that they will experience one of the most unusual meetings of their scientific careers.

ALAN BATTEN
Dominion Astrophysical Observatory

IAU CIRCULARS NOW FREELY AVAILABLE ON THE WEB!

Among the longest-lasting publications of the IAU are the IAU Circulars, issued by the Central Bureau for Astronomical Telegrams under the auspices of Commission 6. This coming October, the IAU Circulars will be celebrating their 75th anniversary. For the first 60 years of publication, the Circulars consisted mainly of postcard notifications of discoveries of comets and novae, with follow-up information in terms of astrometric, orbital, photometric and spectroscopic data.

For the past 15 years, the IAU Circulars have also existed in electronic form, available since 1984 by subscription in the Central Bureau's Computer Service (CS), and since 1988 for distribution by E-mail. The content of the Circulars has also been broadened, with many of the recent issues on the subject of Gamma-Ray Bursts, for example, with correlations of data at wavelengths from X-ray to radio.

Commisssion 6 and the Central Bureau are pleased to announce that, beginning today, the IAU Circulars will be available on the World Wide Web free of charge, though generally after a delay of some hours. Subscribers have been able to use the "Web CS" for more than a year. The Circulars are available in both ASCII and typeset form. Current and many back issues are available, and as noted in Guenther Eichhorns' article in Thursday's *Sidereal Times*, they are indexed in the ADS. To date, there have been 6,720 Circulars. An ongoing program to digitize IAU Circulars more than 15 years old is steadily allowing the inclusion, at least in ASCII form, of more of the old Circulars. It is expected that the set will be complete some time in 1998.

To access the Web CS, see http://cfa-www.harvard.edu/cfa/ps/cbat.html.

BRIAN G. MARSDEN
Vice President, IAU Commission 6

The World Space Observatory: A challenge for the next millennium

Although many discussions are taking place on the exciting subjects which can be investigated with future large facilities, there is one area which is being overlooked. These are facilities for space astrophysics, which are essential to ensure a sound future for astronomy. Instruments that are designed to access those electromagnetic windows that can only be observed by orbital observatories are in danger of disappearing on time scales which can be estimated as 5-10 years.

This dire situation is the consequence of the fact that during the past 40 years, space astronomy became successful because the needs of astronomers coincided with the technology and defense interests of many countries. There is now, however, a serious possibility that this extremely successful symbiosis may come to an end as a consequence of the new pressures (funding restrictions, if nothing else !) being exerted on the world's space agencies.

To avoid these very undesirable circumstances, a new concept has been proposed: a World Space Observatory. This concept was formulated when it was realised that not only continued access to space windows was in danger, but also that this would supply for the developing countries a natural opportunity to participate much earlier in the adventure of frontline astrophysics than would be possible if these countries were compelled to undergo the same evolution as the industrialized world.

The creation of a World Space Observatory would actually relieve the space agencies from the pressure to put significant financial investments into projects that would not always be technology drivers, and also reduce in an important way the claims on the operational costs of space observatories in general. It would also generate the possibility for many developing countries to participate in front-line astrophysics. Although at the current time a World Space Observatory is only in a conceptual stage, further work would undoubtedly lead to many stimulating innovations in the way in which observational astronomy could be done. Anyone who is further interested in this concept should get in touch with the author (E-mail: ww@vilspa.esa.es), and help to turn this challenge for the 21st century into reality.

WILLEM WAMSTEKER
ESA IUE, Madrid

Notice from LOC

ROOM CHANGE
S186 → Room D
S187 → Room B-1
S188 → Room A

Accent on Acronyms

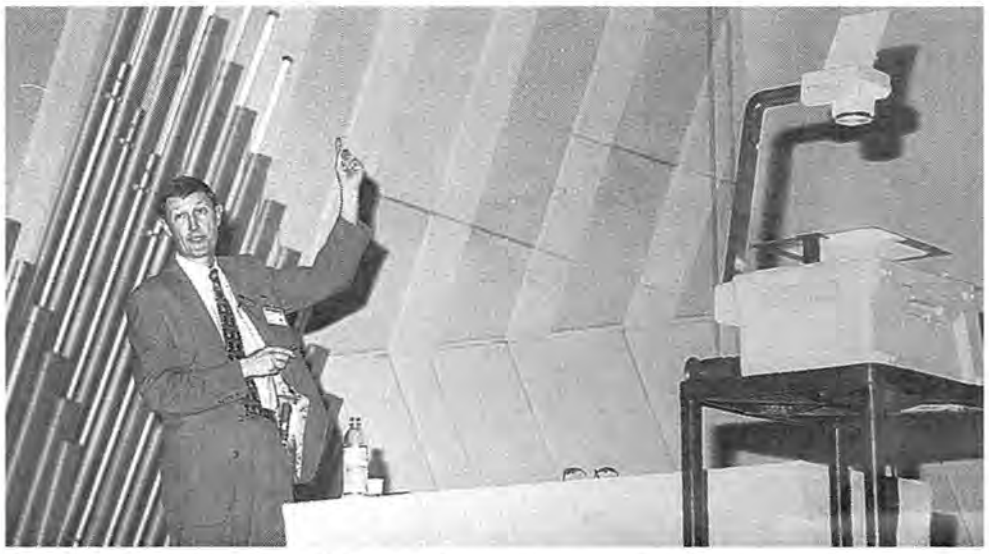
DID YOU KNOW that there are 17,576 three-letter acronyms in English? NASA has used them all.

ADVICE ON ACRONYMS

How do I create a designation which conforms to the IAU Recommendations for Nomenclature?

Refer to one-page "How to refer to a source or designate a new one" found on the WWW at URL: http://cdsweb.u-strasbg.fr/how.html

H.R. DICKEL
Chair, IAU Task Group on Designations



Bob Williams, of the Space Telescope Science Institute, makes a dramatic point while discoursing on the Hubble Deep Field.

General Assembly Infiltrated

You have to admit, it's peculiar. The organizers of this Assembly expected 1,700 participants. In fact, there are nearly 2,000 badge-wearing, jargon-spouting folk are wandering around the KICH and claiming to be astronomers. The Local Organizing Committee originally attributed this surplus to the attractions of the local cuisine and climate. However, further investigation has turned up a more sinister explanation. The General Assembly has been infiltrated by alien beings intent on learning such scientifically-sensitive facts as the effect of line blanketing on the yttrium lines in peculiar A-type stars, or the orbital anomalies of minor, trans-Uranian asteroids.

To put it bluntly, the person sitting next to you may not be a person. Before offering a preprint to anyone, you may wish to check their species. You could, of course, ask for a hair sample and arrange for a genetic test. But a simpler procedure is to observe their feet. These aliens have only four toes, a fact that will be obvious if they wear simple, strap sandals. If their footwear is less amenable to inspection, invite them into one of Kyoto's many shrines. They will be obliged to remove their shoes, and you can count the lumps in their sox.

Another tell-tale sign of alien identity is the fact that they all have heads approximately two meters in diameter, and several hundred eyes.

Offer preprint.

Don't offer preprint.

The Sidereal Times

Kyoto IAU 23

XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.7: Monday, 25 August

HIPPARCOS and Tycho Catalogs

JD14, which takes place today, will see the first, eagerly-awaited scientific results of the ESA space astrometry mission HIPPARCOS being presented at the General Assembly. The HIPPARCOS and Tycho Catalogs were made publicly available two months ago as a 17-volume printed set currently being distributed by ESA, and also through the CDS data center (and mirror sites), and via the HIPPARCOS Web page http://astro.estec.esa.nl/Hipparcos/hipparcos.html.

The HIPPARCOS results are already generating considerable interest as a consequence of their implications for the ages of globular clusters and the universe itself, as well as producing some surprising results on revised open cluster distances. Meanwhile, the Hyades distance and structure has been convincingly pinned down — to the easily-remembered distance modulus of 3.33±0.1 mag.

Ambitious plans for a follow-on space project, GAIA, have already been formulated by ESA member-state scientists. Embracing tens or possibly hundreds of millions of objects with distances and space velocities two or three orders of magnitude more accurately measurable than by HIPPARCOS, GAIA would yield an enormous advance in our understanding of the composition, structure, and kinematics of our galaxy. These, and many other details, will be presented at today's joint discussion.

CATHERINE TURON
Chair, JD 14

Dwarf Galaxies: Diminutive Probes of Galaxy History

People engaged in detailed studies of the nearby universe are asking the question "how have nearby galaxies evolved over the last ~8 Gyr (corresponding to a redshift range of 0-1)," whereas cosmologists studying the distant universe ask "how will distant galaxies evolve in the next ~8 Gyr." Clearly, contributors to JD2 are asking questions about the formation and evolution of dwarf galaxies from two different perspectives. It is important that these two perspectives meet.

The high-redshift community, using straightforward assumptions, predicts large numbers of "remnant" starburst galaxies in the nearby universe. Paradoxically, nearby galaxies have not been scrutinized to deep enough magnitude limits to accurately test this prediction. Studying the color-magnitude diagrams of resolved stars in nearby galaxies is like carrying out paleontological investigations. When did the inhabitants live, how did they live and when did they die? Using resolved stars to study the evolution of galaxies is a straightforward technique, and when main-sequence turnoffs are detected, an unambiguous one as well.

(Continued on page 5)

Eline Tolstoy

Dwarf Galaxies a Big Attraction

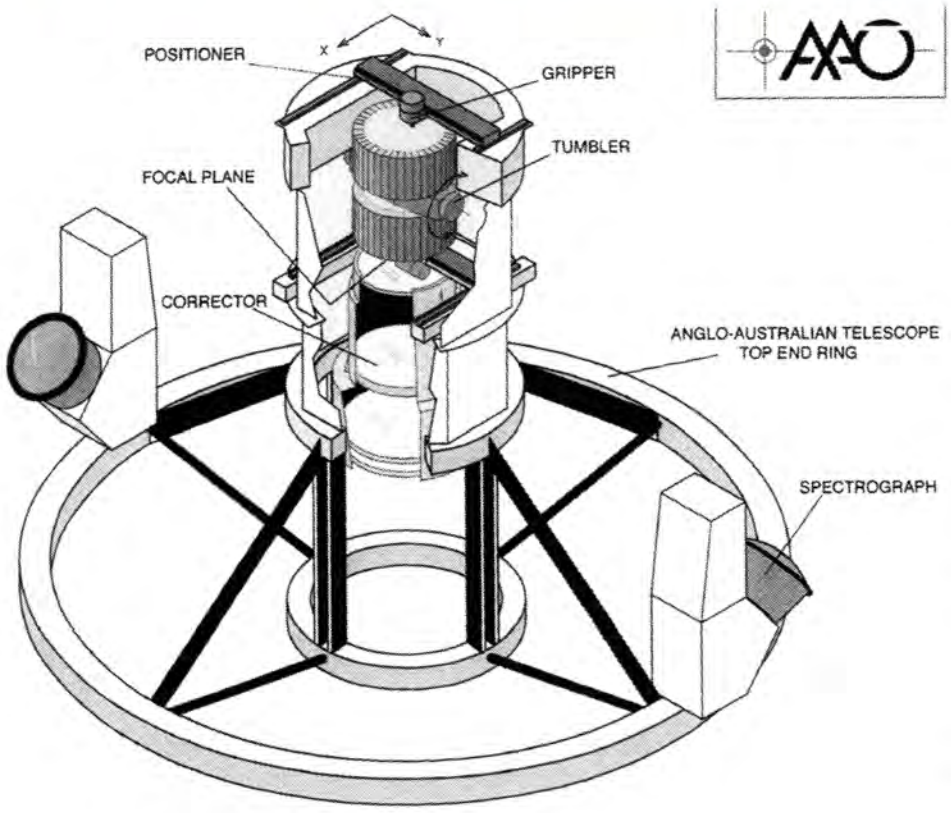
Dwarf galaxies took center stage last Thursday when they were the topic of JD2. Why all this interest? Well, dwarf galaxies are supposedly simple systems and easier to model and understand than their larger counterparts.

They come in two flavors, dwarf elliptical (dE, also referred to as dwarf spheroidal) and dwarf irregular (dIrr, or Magellanic Irregular) systems. The former are gas poor and old, the latter are young as characterized by the age of their stellar counterparts, and gas rich. To say that this is an oversimplification is an understatement.

Star formation has occurred, and in dIrrs is occurring, in bursts, the interval between bursts being of order a gigayear. This provides us with an ideal laboratory to study the conditions thats lead to star formation, something which is well-nigh impossible in bigger galaxies where differential rotation, density waves, violent mixing due to supernova explosions etc., tend to blur the picture.

Because many dIrrs are relatively unevolved, having undergone only a few

(Continued on page 5)



Schematic diagram for the 2dF.

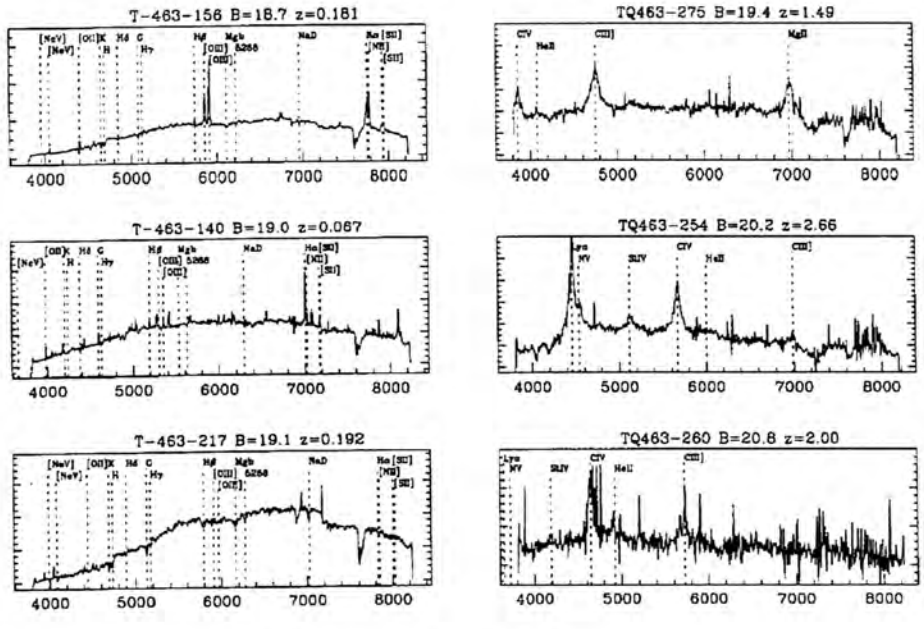
2dF Surveys Now Underway

The era of the new large redshift surveys has arrived. The 2-degree field (2dF) at the Anglo-Australian Telescope (AAT) has begun to obtain redshifts for a sample of 250,000 B<19.5 galaxies and 25,000 B<21 QSOs. The 2dF is a multi-object, fiber-fed facility located at the prime focus of the AAT. It is capable of obtaining optical spectra for up to 400 objects simultaneously over a 2-degree diameter field. A double-buffered system enables the robot positioner to place 400 fibers to 10 micron (0.15 arcsec) accuracy on one field, while observations are being carried out on another field in the focal plane. An ingenious 'tumbler' arrangement then allows a rapid change between field configurations.

The galaxy and QSO surveys will be two of the major projects carried out on the 2dF over the next few years. The surveys began in January, and currently over 2,000 galaxy and 600 QSO spectra have been obtained. With pipeline processing and automatic redshift measurement, over 85% of the objects have a reliable spectroscopic classification and an accurate redshift.

Up until now, 2dF has been operating in a limited capacity with only 200 fibers and one spectrograph. Next month, the full complement of 400 fibers and two spectrographs will be available, and, as field re-configuration times continue to improve, the progress of the surveys will accelerate dramatically. The 2dF galaxy and QSO surveys are due to be completed by the end of 1999. Further details of 2dF and the redshift surveys will be presented at the JD11 meeting on Monday morning.

B.J. BOYLE
AAO



Sample spectra from the 2dF galaxy and QSO redshift surveys.

E-MAIL YOUNG PEOPLE'S FORUM

The European Astronomical Society (EAS) has just started the construction of a Web page dedicated to young people in astronomy. It may be reached through the EAS Web site, hosted by the Institute d'Astrophysique de Paris (http//www.iap.fr). To make this activity more efficient, we will organise an E-mail Young People's Forum for one week in December, 1997.

All young students and post-docs are welcome to join this forum, where we will have senior professional astronomers available to answer questions about research, education, access to facilities, etc. We therefore welcome offers from collegues who are willing to participate. Details will be announced soon through E-mail to the EAS page. Any information on the following topics for our young people's forum page will be particularly appreciated:
-New meetings and schools
-Ph.D. projects at institutes and universities
-Astronomy education activities
-Job opportunities

EAS is a relatively new society, founded in 1990. It has about 1,500 professional astronomer members from all European countries, and all national astronomical societies are affiliated with it. Its first President was Prof. L. Woltjer. Presently the executive board is composed of Jean-Paul Zahn (President), Alvio Renzini and Francisco Sanchez (Vice-Presidents), M. Teresa Lago (Secretary), and Birgitta Norsdroem (Treasurer).

Among the activities of the EAS is the organization of a yearly European Astronomical Meeting jointly with one of the national societies (JENAM). Meetings have taken place in Liege, Torun, Edinburgh, Catania, and Thessaloniki.

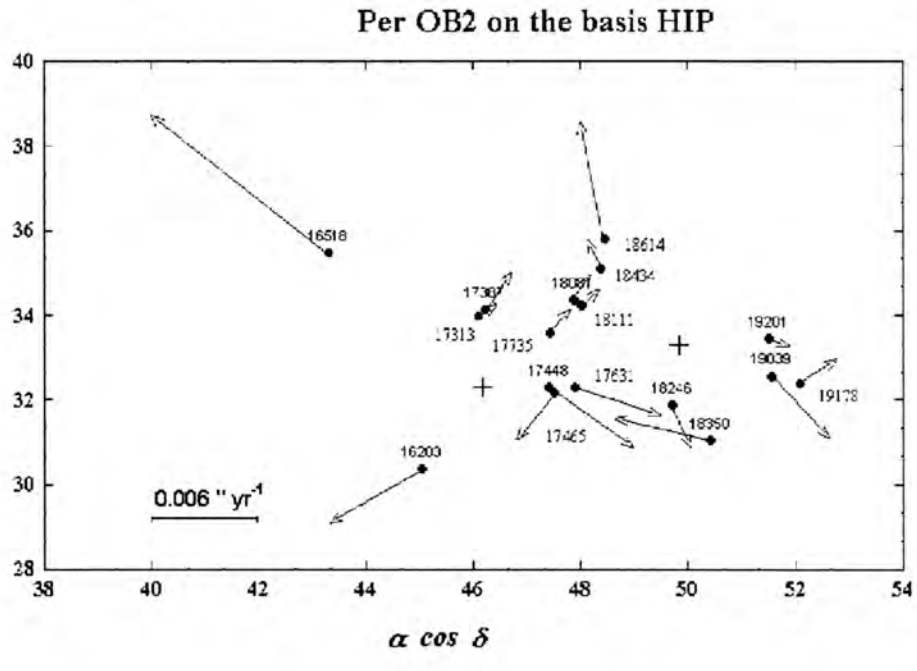
The next JENAM98 will be held in Prague, September 9-12, 1998.

MARY KONTIZAS
(mkontiza@atlas.uoa.gr)
Editor, EAS Newsletter

Expansion of the Perseus OB2 Association as Derived from HIPPARCOS Data

The expansion of stellar associations predicted by Ambartsumian in 1947 was observationally confirmed for the case of the Per OB2 association by Blaauw in 1952. The analysis of recently available HIPPARCOS data for the same region confirms Blaauw's result, as well as showing that there are two separate, expanding subgroups of OB stars within the association. The calculated expansion ages of these subgroups are 1.3 and 2.0 million years (see figure).

V. HAMBARYAN
Byurakan Observatory, Armenia



Auto-classification of Stellar Spectra Comes of Age

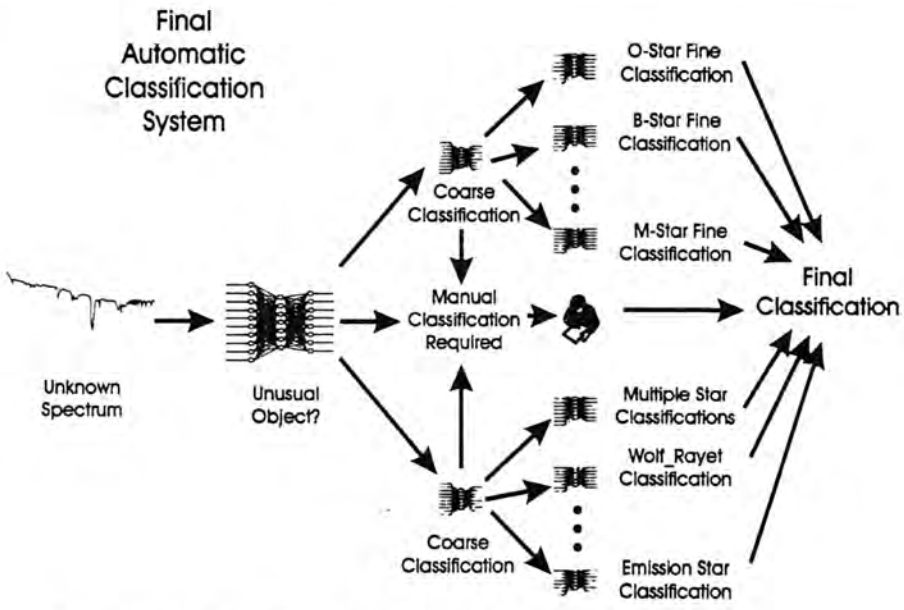
"Automated spectral classification techniques are mature," began Ted von Hippel at a special session of Commission 45. He and other presenters went on to demonstrate the truth of this statement. Both stellar spectral and luminosity types can now be derived by artificial neural networks (ANNs) and weighted metric-distance methods with the same accuracy as that obtained by expert human classifiers, Bruce Weaver showed. Such heavy-duty techniques are needed because pattern recognition in spectra is a highly non-linear problem, for which humans can be readily trained to find a solution.

The complete training of automated systems now needs a high-quality, homogeneous library of digital spectra that span the MK System's standard stars. This library would firmly anchor an automated classification package in the well-proven and productive MK System. Visionaries like Richard Gray can foresee such a package placed at telescopes in the output stream of data-acquisition computers. These computers would instantly translate spectra into rough MK classifications, and so signal anything of immediate interest. Back at home would be a more sophisticated package that might even include, at least via Internet, a human classifier to scrutinize the most peculiar spectra.

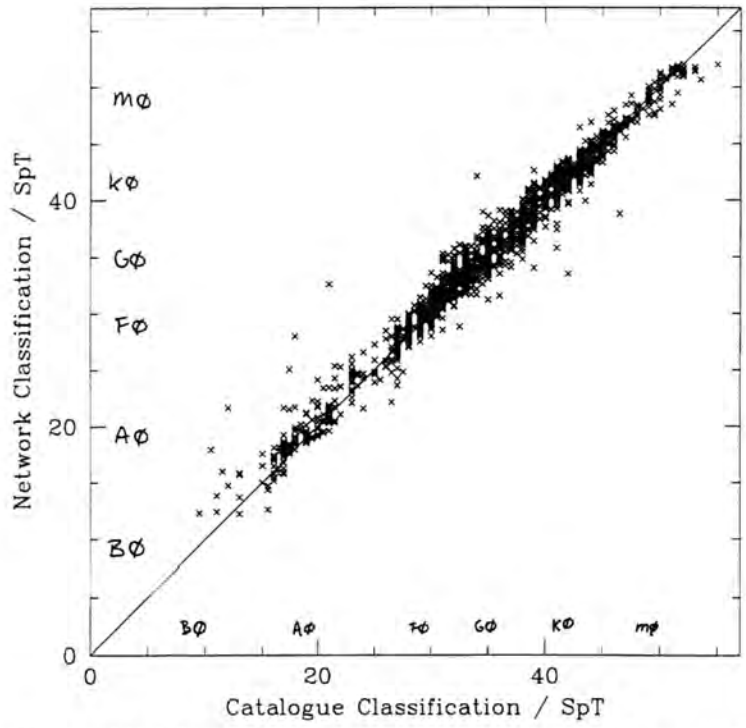
Could the automated classification techniques be "trained" with synthesized spectra? Yes, we learned that an automated system has been so trained and even yielded metallicities in addition to effective temperatures and surface gravities. But these data depend on current atmospheric models. For durability despite changes in theory, it is much better to follow the wisdom of "M" and "K", and anchor spectral classifications in an autonomous system of standards through a proposed comprehensive library. This library should also please our galaxy-oriented colleagues who want the best possible input to synthesize stellar populations.

The session ended with a sense of optimism. The mega-spectral outputs of surveys such as the Sloan Digital Sky Survey, described to us by Andy Connolly, could be coped with, and the potential galactic structure and stellar atmospheric insights retrieved. Automated spectral classification is ready — with sufficient funding — to enter a new age of data acquisition.

CHRISTOPHER CORBALLY
Vatican Observatory



A partially-realized scheme for spectral classification via ANNs. Courtesy of Bruce Weaver.



Michigan Spectral Catalogue classifications compared with ANN spectral classifications. Courtesy of Ted von Hippel.

New Plates for Astrophotography

In response to requests from several astronomical institutes in Russia, The Euro-Asian Astronomical Society (EAAS) has secured grants from Russian foundations to develop and produce high quality astronomical plates suitable for long exposures. These plates, known by the designation NT-1A, were developed at DAR Ltd, under the directorship of Dr. D. Mikhailov. The plates are comparable to ORWO ZU-21 or Kodak II aO, blue-sensitive emulsions, and are available in sizes ranging from 9x12 up to 30x30 square cm. The current price of the plates is about US $300 per square meter (several times less than the ORWO or Kodak plates). The NT-1A plates have finer grain than the ZU-21, as well.

New technology has been used to fabricate the new plates. Quasi-T AG Br crystals, polished glass, and an improved coating characterize the NT-1A product. Note that before use, they should be hydrogen sensitized.

The plates have been tested at the Sternberg Astronomical Institute and in several observatories of the former Soviet Union. The limiting magnitude of the new plates and their astrometric properties are better than those of ORWO ZU-21. They are well suited for stellar photography in the presence of light pollution. The plates are coated on 2.6 mm glass, and a variant, NT-1AC is available on 1.7 mm glass. Plate sizes up to 80 x 80 cm can be ordered. The development of ortho and panchromatic plates is also anticipated. Please contact the author for more information.

N.G. BOCHKAREV
(boch@astronomy.msk.su)
Euro-Asian Astronomical Society, Moscow

One of the twins. A model of the Gemini 8 m telescope.

JD15 and GRAPE

If theorists are supposed to know what the letters "CCD" mean, observers should know what "GRAPE" means — GRAvity PipelinE. Just as CCDs revolutionized observational astronomy, GRAPE has transformed computational astrophysics, at least for stellar dynamics. The GRAPE team, led by Daiichiro Sugimoto at Tokyo, has provided several groups around the world with unprecedented power for studying the evolution of rich star clusters.

The other major stimulus in this field has been the burgeoning observational data on the stellar content of globular clusters: their mass function, binaries, blue stragglers, degenerate stars, and so on. All these issues are interrelated. The mass function evolves by dynamical processes, and binaries influence the dynamical evolution.

Joint Discussion 15 is the seminar wherein theorists and observers can attempt a synthesis of all these aspects of globular clusters. In addition, there is a session on the stellar dynamics of bars and disks, and two leading members of the GRAPE team will tell us what is in the "pipeline."

D.C. HEGGIE
Chair, JD15

The Gemini Observatory

For the first time, the astronomical communities of the US, UK, Canada, Chile, Argentina, Brazil and (possibly) Australia will have access to forefront optical/IR 8-meter telescopes in both hemispheres. By focusing on superb image quality and infrared performance, these telescopes will be able to use the very best conditions Manua Kea in Hawaii and Cerro Pachon in Chile have to offer. The challenge we face in exploiting diffraction-limited images at 1.6 microns or infrared emissivities in the thermal infrared of a few percent is to find ways of avoiding turning a 2-3 night observing run into a frustrating weather-dependent lottery. In response to this challenge, the Gemini science community has decided that half the time at the Gemini Observatory will be allocated as queue based observations. In this new observing mode, resident staff astronomers will attempt to match observations to conditions. To get a feel how the Gemini Observatory might look to an astronomer, imagine being at Gemini South in the early years of the next century...

It is evening at Cerro Pachon, and the Gemini support associate and staff astronomer are working through the beginning of the night's queued observations. While the support associate is reviewing the latest water vapor and seeing forecasts to see how long the current conditions will last, the service observer is discussing with his colleague in La Serena which mix of observations will make the best use of tonight's conditions. They re-run a couple of options through the automatic scheduler, since the Gemini North crew has asked if Gemini South could make a few calibration observations to complete last night's Mauna Kea file.

As the support associate on Cerro Pachon is starting an infrared spectroscopic observation of a high redshift galaxy, it becomes obvious that there is something peculiar about its emission lines. The staff astronomer decides that this is worth calling the principal investigator in Cambridge, England. After a brief teleconference, the PI decides to log on from home to remotely look at the extracted spectrum.

The next observation is listed as classical remote observing, and the observers in Tucson and Sao Paulo have been waiting to connect to the system and observe. In Tucson, the PI dials up Gemini South and establishes a connection to the site — giving her control of the science operations. As she works, the telescope updates a video image of the guide field as well as allowing her to interact via a full display — identical to that available on-site. From Sao Paulo her colleague has connected to the pipeline data reduction system, and is "leafing through" the night's calibration files to see if he can find suitable arc and flat field frames.

The same video links allow the observers in Tucson and Sao Paulo to interact with both the support associate and staff astronomer on Cerro Pachon. A couple of hours later the staff astronomer in Hawaii fires up the link to "watch" how the Cerro Pachon program is going, since she will be supporting these same two astronomers as they complete their time allocation using Gemini North. It's observing for the new millennium.

MATT MOUNTAIN
Director, Gemini 8-M Telescopes Project

Emperor's Visit: A Dissenting View

How did you feel attending the opening ceremony? We suppose that many of you felt that the presence of the Emperor and Empress was glorious or reflected a long tradition. We fear, however, that some of you might have felt somewhat uncomfortable. The former Emperor neither abdicated from the throne after the war nor offered sufficient compensation to victims of the Japanese government, despite the fact that the war prosecuted in the name of "Emperor" caused tremendous damage in many countries, especially in Asia. The new imperial system, in which the Emperor is defined as "the Symbol of the State and Unity of People" by the Japanese constitution of1947, is controversial, even in Japan.

About their Majesties' presence at the opening ceremony, Prof. D. Sugimoto, chairperson of the NOC, wrote ".... this General Assembly has been selected (by the Science Council of Japan) ...." (*Sidereal Times*, No.1, p.2). The selection was made secretly and decided independently of our wishes. Such an anti-democratic process is rooted in the pre-war Emperor system, we believe, and will be critically discussed later within the Astronomical Society of Japan.

The possible discomfort mentioned above could not be avoided. All we can do now is to let you know that the decisions regarding the Emperor's visit did not reflect the opinion of all Japanese astronomers, and that we wish to make every effort to promote international cooperation in astronomy free from the shadow of politics.

This contribution was written by the undersigned, based on discussions with some 15 Japanese astronomers. Your comments, pro and con, are welcome.

SHIRO NISHIMURA
(nishmrsr@cc.nao.ac.jp)
National Astronomical Observatory, Mitaka

Free Tickets to "Contact"

The sci-fi movie "Contact", based on the novel written by the late Prof. Carl Sagan, will be screened in Japan beginning in September. Thanks to the generosity of the company that will be distributing this film in Japan, the LOC is pleased to offer 200 free tickets to a preview showing, to be held at 19:00 on August 28 at the KYOTO-SHOUCH-IKU-ZA. If you would like to see this very exciting new movie, please pick up an order form at the Information/LOC desk between 17:30 and 18:15 on August 26. The LOC will draw lots to decide the winners.

The winning ticket numbers will be posted on the afternoon of August 27. If you find the number of your order form on the bulletin board, then you are among the lucky winners. In that case, please exchange the order form for your invitation at the Information/LOC desk sometime on August 27.

Please note that this invitation applies only to participants who have badges with blue, light blue, and green colors.

Dwarf Galaxies: Diminutive Probes of Galaxy History
(From page 1)

Stars are the most basic constituents of the universe; we understand in some detail how they evolve with time. Most stars live for a very long time, many gigayears. So if we use low-mass stars as probes, we can look far back into the history of a galaxy. For each star for which we can measure a color, we can know its age as well. By picking out many stars over a whole galaxy, we can work out when and where stars have been forming, and hence construct a picture of how the galaxy has evolved over billions of years. For example, a short extreme "burst" of star formation is required to explain the number and luminosity distributions of ''faint blue galaxies'' at z~0.3.

To detect stars from a burst population unambiguously, a main-sequence turnoff must be detected at an absolute magnitude, Mv of less than or equal ~+2, which for the nearest, isolated, high galactic latitude galaxy, IC1613, corresponds to a V~27.

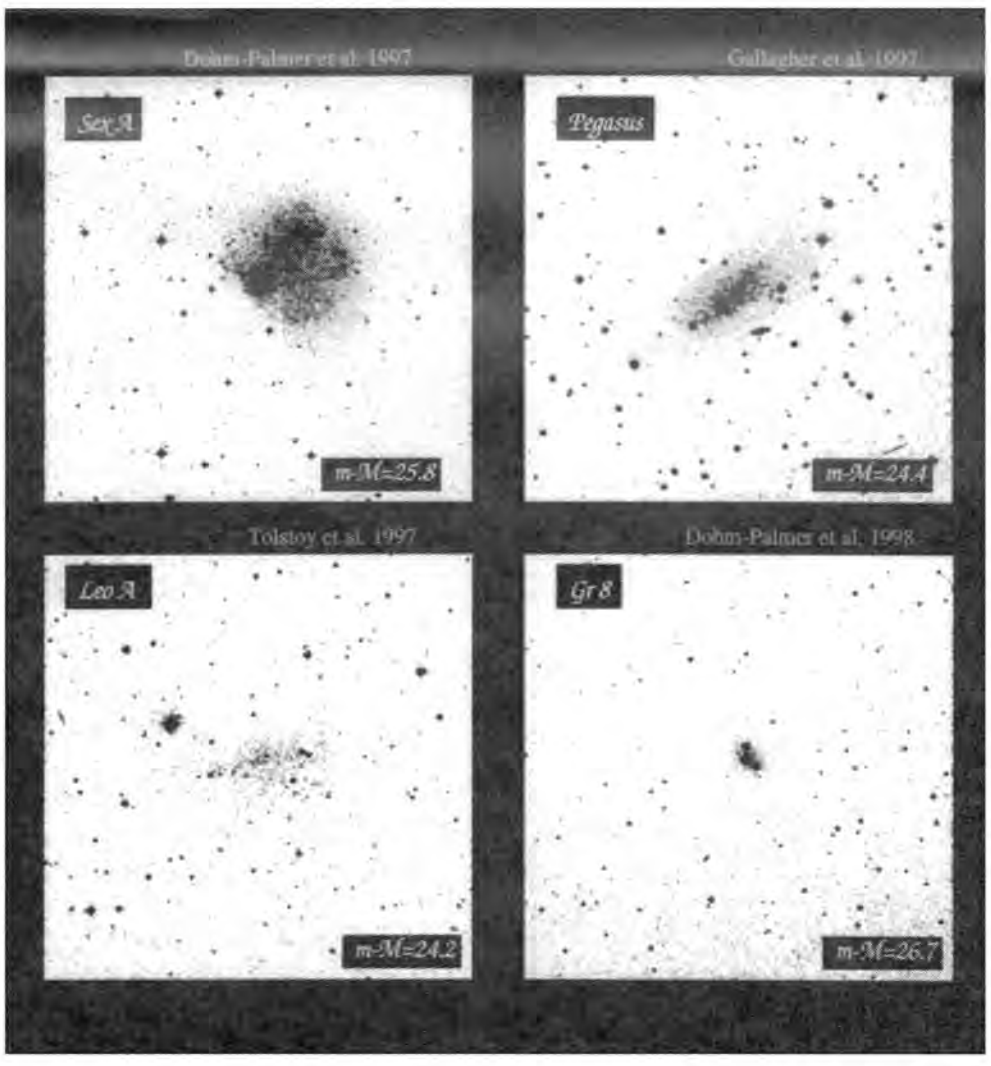
There is, to date, no particular evidence for bursts of star formation of the required intensity to be bright enough to look like the faint blue galaxies.

In the coming months, HST will look in detail at the resolved stellar populations of several nearby irregular galaxies to see if it's feasible to detect discrete bursts of star formation occuring in such systems. For example, 40 orbits will be devoted to deep V and I imaging at one position in both IC1613 and Sextans A. These could perhaps be called "Baade Deep Fields" after the pioneering paper on resolved stellar populations published in 1944 by Walter Baade.

Much work remains to be done in understanding the old stellar populations in nearby galaxies. High resolution, deep imaging is a fundamental requirement. The HST Advanced Camera will be able to push the detection limits deeper than WFPC2, and 8 m class telescopes on the ground capable of high quality imaging (*e.g.* the VLT) will also be able to make fundamental contributions.

It is our hope that soon there will be a connection between our understanding of galaxies in the nearby universe, where distances are measured in parsecs and many details can be studied, and those more distant objects where distances are described by redshift.

ELINE TOLSTOY
Space Telescope, European Coordinating Facility



Four dwarf irregular galaxies which have recently been observed with the HST to produce very detailed color-magniude diagrams. Are these what faint blue galaxies become?

Additional Astronomers Identified

The photo that appeared in Thursday's *Sidereal Times* (No. 4, p. 4) under the heading "From the Past" also includes an interesting family of four. Lawrence Aller is the somewhat ample, smiling man at the right. His wife Rosalind at left is holding the new-born Margo Aller, and the forlorn-looking boy on her left is Hugh Aller, now a Professor of Astronomy at the University of Michigan.

Light on Local Customs

You may have noticed that Kyoto's public spaces are cleaner than a cow that's waded into a river full of piranhas. For westerners who are used to shambling through knee-high clutter every time they venture onto the sidewalks, Kyoto's fanatical fastidiousness is unnerving.

Indeed, streets in Kyoto are so immaculate, traffic accident victims can undergo surgery in-place, saving on ambulance fees. The subways are clean enough that you can eat off the floor, thereby allowing you to leave work before dinner and arrive home after. Hotel rooms are vacuumed so often, the carpets require weekly replacement.

We have asked several local experts to explain this tendency towards the tidy. "Our country is too small for dirt," was one puzzling response. "It minimizes entropy," was another.

SETH SHOSTAK

Hiro Wakano chows down on his way downtown. While dining off the subway floor is perfectly safe, it is not recommended during rush hour.

Dwarf Galaxies a Big Attraction
(From page 1)

bursts of star formation, their heavy element abundance is low, making them ideal laboratories for determining the primordial helium abundance (Yp). The Holy Grail in this field is to find a galaxy that is forming stars for the very first time. The two most metal deficient objects known to date are I Zwicky 18 and SBS0335-052 (talks by Thuan and Izotov).

Finding intrinsically small and faint objects in the optical regime is far from trivial, as discussed by Freeman and Morshidi. Hopes are high that the Parkes multi-beam receiver will provide plenty of detections of dIrrs in the neutral hydrogen line (HI). Carignan showed tantalizing evidence that HI gas in dE is located beyond their optical image, possibly ejected by a previous burst of star formation. Lo and van Woerden, in their presentations, forever dispelled the idea that dIrrs are simple systems.

Grebel and Tolstoy showed some stunning color-magnitude diagrams with clearly separated (in time) star-forming events in some nearby dwarf galaxies, allowing accurate dating, similar to the use of tree rings. Duc and Mirabel warned us that not all dwarf galaxies are unevolved young systems, but that some are produced as the debris of catastrophic interactions of large galaxies. Lastly, we heard from Guzman and Koo, who showed that the population of faint blue galaxies at intermediate redshift (z=0.5-1.0) can be accounted for by a mixed population of actively star forming dwarf galaxies (HII galaxies) and star-burst nuclei. This is also the redshift range where Compact Narrow Emission-Line Galaxies are found, the presumed progenitors for objects such as NGC205.

If the above summary has whet your appetite, note that Trinh X. Thuan has announced that a meeting on dwarf galaxies and their implications for cosmology will be held from 14-21 March, 1998 in Les Arcs 1800, Savoie, France. To receive a first announcement, please send an E-mail to txt@starburst.astro.virginia.edu.

ELIAS BRINKS
Universidad de Guanajuato, Mexico

Education and the IAU

Education is the method by which we attract and train the next generation of astronomers, and the means by which we inform taxpayers about the nature, excitement, and importance of our science. Everyone should be exposed to the basic concepts of astronomy: its practical and philosophical applications, its emotional and aesthetic appeal, its message about our cosmic origins and our place in time and space. It illustrates the observational mode of scientific inquiry, and is a wonderful tool for teaching concepts of gravity and light. It attracts young people to science and technology, and promotes public interest in science. These are especially important in the developing countries. It is a lifelong interest or hobby for millions of people.

Astronomy educators face major challenges: to develop curriculum and resources which are effective and appropriate, to train teachers at every level, to reach all students, not just the elite, and to devise ways for students to observe and appreciate the sky, even though "the stars come out at night, but the students don't."

Astronomy education happens, not just in the classroom, but in a multitude of other places: TV and radio, newspapers, magazines and books, planetariums, science centers and public observatories, amateur astronomy clubs, and increasingly on the Internet. Astronomers must therefore work in partnership with all these other astronomy educators, as well as with teachers in the formal education system. Dr. Syuzo Isobe has organized a one-day workshop for over 100 local school teachers on Thursday, August 28, at Kyoto Computer School. See the Commisssion 46 bulletin board for further details. This is a traditional feature of IAU General Assemblies.

Only one of the IAU's 40 commissions deals specifically with education, Commission 46, Teaching of Astronomy. Its goal is "to develop and improve astronomy education, at every level, throughout the world." Many of its programs are aimed at the astronomically developing countries. You can learn more about these at JD 20, Enhancing Astronomical Research and Education in Developing Countries, to be held Tuesday, August 26 in room C1. Or visit our Web site at http://phys.open.ac.uk/IAU46/.

JOHN R. PERCY
President, Commission 46

The Naming of Solar System Bodies

The IAU Working Group for Planetary System Nomenclature (WGPSN) is entrusted with the task of naming surface features on planets, satellites, and asteroids. Last Wednesday, WGPSN met and passed more than 500 names, mainly on Venus and the Galilean satellites which have in recent years been mapped in detail by, respectively, the Magellan and Galileo spacecraft.

The ancient Greeks and Romans gave mythological names to the major planets. We continue this naming tradition, but draw also on the mythologies of many other cultures and use several other themes. Craters on the Moon and Mars are named for outstanding scientists; on Mercury, authors and artists are also commemorated. Venus is the abode of notable women — the only exception being Clerk Maxwell, who occupies the tall mountain *Maxwell Montes* in recognition of the fact that, without knowledge of his famous laws of electromagnetism, the radar mapping of Venus would never have been possible.

WGPSN also has an honorable but sad duty: to select proper planetary features to be named for many notable, recently-deceased astronomers. It is regrettable that, during just the last nine months, four astronomers have had to be added to this list: Carl Sagan, Clyde Tombough, Eugene Shoemaker, and Jurgen Rahe.

KAARE AKSNES
President of WGPSN

Notice from LOC

TIME CHANGE OF BANQUET
18:00 → 19:30

ROOM CHANGE
S186 → Room D
S187 → Room B-1
S188 → Room A

Accent on Acronyms

DID YOU KNOW that acronyms were widely used by the Aztecs both for defense and for cleaning fish?

ADAPTING to meet future needs - check out the following posters:

"Recent Developments of the IAU Task Group on Designations as a Resource for Electronic Publishing" posted in Joint Discussion 12.

"Nomenclature of Extrasolar Planets: A New Challenge" posted in JD 13.

AVOID AMBIGUOUS ACRONYMS

How do I avoid an ambiguous acronym?

Before adopting a particular acronym, be sure that it is not already in use by checking the regularly-updated, on-line "Dictionary of Nomenclature of Celestial Objects" located on the WWW at URL: http://cdsweb.u-strasbg.fr/cgi-bin/Dic.

H.R. DICKEL
Chair, IAU Task Group on Designations

Industrial Uses for Tofu

The Kyoto Technical College has just released a three-volume study describing new uses for tofu. This impressive report is bound to boost interest in the tasteless foodstuff. Made from soybeans, tofu is particularly prized for the fact that it can be easily eaten without teeth. Over a thousand new recipes for tofu are included in the report, but the most interesting aspects of the study describe using tofu as wall insulation, for lubicrating aircraft engines, and as a herbicide. When kiln dried, it is an adequate substitute for concrete. "We're converting our tanker fleet now," said Sojo Dimajio, President of All-Nippon Shipping Ltd.

Notes on the Kyoto Walking Tours

Remarks:
1) Detailed information is posted on the bulletin board.
2) Registration is accepted at the Information/LOC desk.
3) Last-minute registration may be accepted.
4) Tour meeting point is in front of the bulletin board.

August 26 (Tuesday) Morning (9:00-12:00)
A01. The site of Manshuin gate and Shisendo (Old Hermitage), Fee 2,000 Yen {1,800 Yen for pass owner} includes Japanese tea, max. 10 persons
A03. The Yuzen museum of arts, Fee 1,100 Yen {500 Yen for pass owner}, max. 10 persons
A04. Shopping in Nishiki-koji Street and Teramachi-dori/Shin-Kyogoku-dori Fee 600 Yen {free for pass owner}, max. 10 persons
A08. Museum of traditional industry in Kyoto and Heian Shrine, Fee 500 Yen {free for pass owner}, max. 10 persons
A10. Kiyomizudera Temple and environs, Fee 1,000 Yen {300 Yen for pass owner}, max.10 persons
A11. Daitokuji Temple and Imamiya Shrine, Fee 800 Yen {free for pass owner}, max. 10 persons

August 26 (Tuesday) Afternoon (13:30-16:30)
B02. Museums of Japanese authentic sweets, and Nishijin textile, Fee 500 Yen {free for pass owner}, max. 10 persons
B06. "Kinshi Masamune" (Japanese Sake) Museum, Fee 1,200 Yen {650 Yen for pass owner} (includes green tea), max. 10 persons
B08. Museum of traditional industry in Kyoto, and Heian Shrine, Fee 500 Yen {free for pass owner}, max. 10 persons
B13. Sekizan Zen'in Temple, Fee free, max. 10 persons

August 26 (Monday) full day (9:00-16:30)
C-1. Ginkakuji and Nanzenji Temples, Fee 4,200 Yen {3,500 Yen for pass owner} Lunch included, max. 10 persons
C-2. Old Imperial Palace and Nijo Castle, Fee 2,700 Yen {2,000 Yen for pass owner}, max. 9 persons
C-3. Kiyomizu and Chion-in Temples, Fee 1,800 Yen {1,000 Yen for pass owner}, max. 10 persons
C-4. Kinkakuji and Ryoanji, Fee 4,600 Yen {4,100 Yen for pass owner}, max. 10 persons

Help Wanted!

The library of the newly founded Department of Astronomy of the Universidad de Guanajuato, Mexico, welcomes donations of books and/or journals to fill in the considerable gaps which exist in their collection. For details, please send an E-mail to: ebrinks@astro.ugto.mx

The Sidereal Times

Kyoto IAU23

IAU XXIIIrd General Assembly - Kyoto 1997

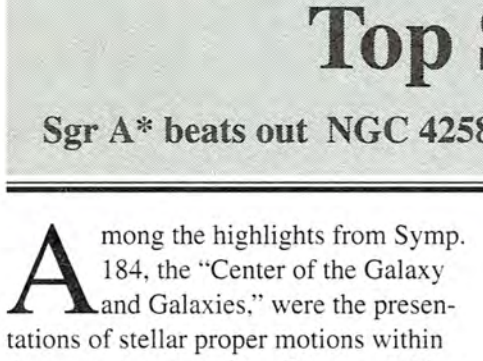
Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.8: Tuesday, 26 August

Galactic Center Claims Top Spot:

Sgr A* beats out NGC 4258 as best black hole candidate

Among the highlights from Symp. 184, the "Center of the Galaxy and Galaxies," were the presentations of stellar proper motions within the central parsec of the Galaxy, probing the gravitational potential of the center down to a few milliparsecs. Andreas Eckart and Reinhard Genzel from the MPE in Garching presented the results of several years of high-resolution NIR speckle imaging of the central star cluster, measuring stellar velocities of several hundred km/s up to ~2000 km/s, peaking near Sgr A* (the compact radio source at the center). Together with radial velocity dispersions derived from NIR spectroscopy, the German team has determined that there must be a dark point mass of $2.61(\pm0.2)*10^6$ M_{sol} at the position of Sgr A*. These results were confirmed by the UCLA group, Andrea Ghez, Mark Morris, and Eric Becklin, using the superior resolution of the Keck Telescope. During the past three years, using slightly different techniques and with 50 milliarcsec resolution, they have found that a central dark mass of $2.7(\pm0.2)*10^6$ M_{sol} is necessary.



Angela Coter and Heino Falcke in a compact configuration.

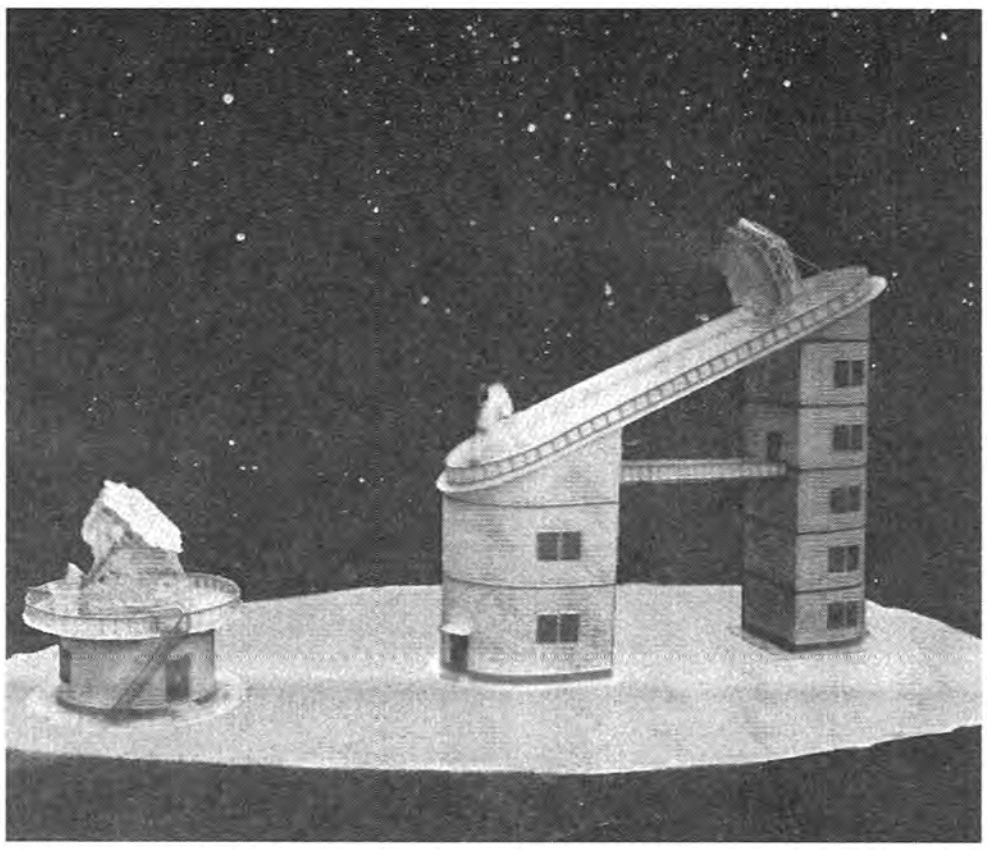
From these measurements, Eyal Maoz infers that any possible alternative to a black hole, such as a cluster of stellar remnants, would involve a lifetime until core collapse that is unreasonably short. Since the estimated mass of Sgr A* is smaller than the present leading black hole candidate in NGC 4258, the inferred cluster lifetime would be even less than for NGC 4258, making Sgr A* the current best candidate in the known universe for a supermassive black hole.

The newly-determined mass estimates suggest that with future (sub)mm-VLBI techniques we may, in principle, even be able to obtain a direct picture of the black hole by imaging it against the radio background of Sgr A*. The existence of such a compact component at millimeter to sub-mm wavelengths was inferred by the results of a recent effort to measure the spectrum of Sgr A* simultaneously on three continents, including here in Japan at the Nobeyama 45 m telescope (Falcke, Matsuo, Zylka, *et al.*).

The quality of the data obtained at the Keck in only three years highlights the possiblities for important scientific advances using the latest generation of large ground-based telescopes, and may be one of the most significant results of the Keck Telescope to date. However, the work of Eckart and Genzel illustrates that with improved techniques, smaller telescopes can still lead the way in situations in which both a scientist's initiative and an institution's (in this case ESO) cooperation are present.

A more complete summary of all the exciting results of Symp. 184 will be presented in the next issue of the "Galactic Center Newsletter" (GCNEWS, see http://www.astro.umd.edu/~gcnews) which, since the last GC conference in Chile, has provided over 200 active members of the Galactic Center community with the latest abstracts and information. GCNEWS is one of a growing number of subject-specific electronic newsletters in astronomy, and is presented in the Event Hall in connection with JD12 (003P) on the new inroads of electronic publishing.

ANGELA COTER
JPL/Caltech, editor GCNEWS
HEINO FALCKE
MPIfR Bonn, editor GCNEWS



The proposed LAMOST 4 m Schmidt telescope.

Chinese Astronomers Start 4 m Schmidt Telescope

The Chinese government has recently approved the Large Sky Area Multi-Object Fiber Spectroscope Telescope (LAMOST) project as one of the National Large Scientific Projects.

LAMOST is a meridian reflecting Schmidt telescope. The optical system is horizontal, and tilted at 25 degrees to the horizontal along a north-south axis. The primary mirror is spherical and segmented. At its spherical center, there is a plane mirror that is also segmented. The special shape necessary for a reflecting Schmidt correction plate is realized by using active optics. The clear aperture is 4 m, and the f-ratio is 5.0. About 4,000 optical fibers will lead from the focal surface, and will be connected to 16 spectrographs.

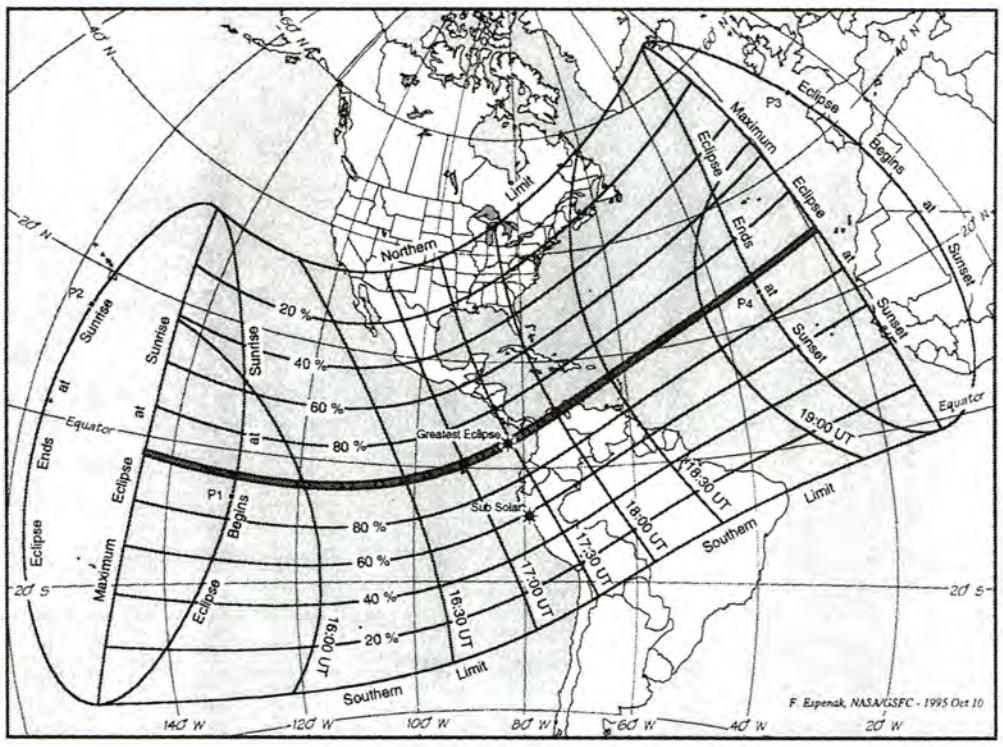
LAMOST will be located at the Xinlong station of the Beijing Astronomical Observatory. The region of sky to be observed will be from declinations of -10 to +90 degrees. Seven years will be required for telescope construction.

For multiple-object, spectroscopic observations, the LAMOST will be the most powerful instrument extant. Projects that use LAMOST for ambitious spectroscopic investigations have been proposed. These include a survey of ten million galaxies and stars, many variable objects, and the identification of numerous objects found by radio, X-ray, IR and other sky surveys.

YAOQUAN CHU
(yqchu@hpe25.nic.ustc.edu.cn)
Univ. of Science and Technology, Hefei, China
YONG HENG ZHAO
Beijing Astronomical Observatory, China

Total Solar Eclipse of 1998 Feb 26

FIGURE 2: STEREOGRAPHIC PROJECTION MAP OF THE ECLIPSE PATH



Eclipse path for February 26, 1998. F.Espenak, NASA/GSFC

Working Group on Eclipses

The IAU's Working Group on Eclipses coordinates information and professional expeditions to make observations at total solar eclipses. At the 1994 eclipse, it arranged a joint site for astronomers from 9 countries at Putre, near Chile's northern border, far north of the existing Chilean observatories.

During the next triennium, two total eclipses will occur. On February 26, 1998, totality will cross parts of Panama, Columbia, and Venezuela in addition to the Caribbean islands of Aruba, Curacao, Guadeloupe, Antigua, and Montserrat. On August 11, 1999, totality will cross Europe and southern Asia, from England's southwestern tip, across northern France, southern Luxembourg, Germany, Switzerland, Austria, Hungary, Romania, Bulgaria, Turkey, Syria, Iraq, Iran, reaching Pakistan and India. The weather is predicted to be most favorable in eastern Europe and farther east. The Bucharest Observatory is on the centerline, and is starting a competition to find the best uses for its telescopes.

Annular eclipses will cross parts of Indonesia and Malaysia on August 22, 1998 and Australia on February 16, 1999. A partial eclipse will be visible in Australia this September 2nd.

During total and annular eclipses, partial eclipses are visible to millions of people to the sides of the centerline. IAU Commission 46 on the Teaching of Astronomy has a subcommittee on Public Education on the Occasion of Solar Eclipses to try to take advantage of these times to inform the public about astronomy as well as to provide information on observing the eclipse safely. We invite astronomers from the countries from which partial, total, or annular phases are visible to contact us for coordination of public education activities.

The IAU Working Group on Eclipses maintains a Web site at http://www.astro.williams.edu/IAU_eclipses. It maintains links to the NASA Reference Publications on eclipses by WG members Fred Espenak and Jay Anderson that provide maps and weather information. Those planning eclipse expeditions should contact us so that we can keep lists of participants and can help with coordination of customs and other tasks.

J.M. PASACHOFF
Chair, WG on Eclipse, Chair, Commission 46 Subcommittee on Eclipse Education

Tickets for Bullet Train

At some hotels you can buy a discount ticket for the *Shinkansen* Bullet Train from Kyoto to Tokyo. The ticket is called a "*Shinkansen* Economy ticket". It includes not only the fare, but also a supplemental charge for the *Shinkansen*, including a seat reservation. Please contact the desk at your hotel for details.

The LOC

1999 Solar Eclipse Crosses Romania

The total solar eclipse of August 11, 1999 will be an exceptional event. It is the last eclipse visible from Europe for several decades, and practically bisects the continent, crossing nine countries. It will take place in midsummer, and near midday when the sun is high in the sky. The tourist count will also be high in August.

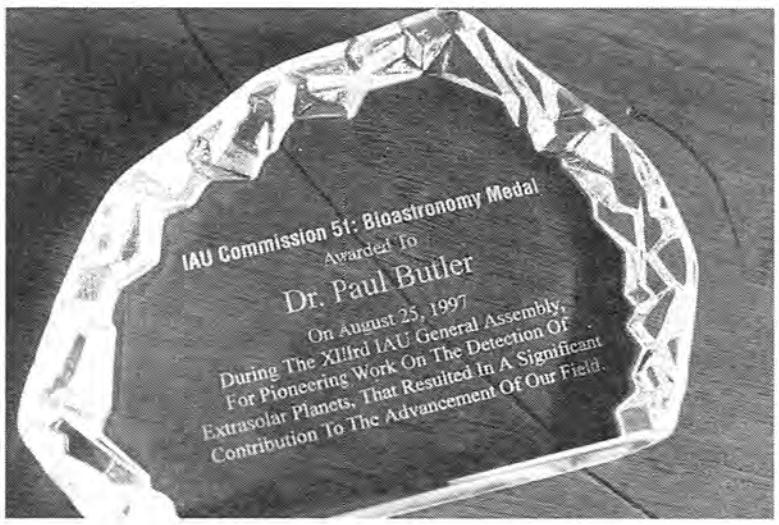
The maximum duration (2 min 23s) of the eclipse will be in Romania, and Bucharest is the only European capital situated on the centerline of totality. It also has the only professional observatory on this line boasting a solar telescope.

To cover the extremely wide range of problems raised by this event (for example, the tourists!), as well as to collect the funds necessary for such a large program, we have set up the International Association "ECLIPSA 99."

This is a non-government, apolitical and non-profit organization. One of its aims is to prepare optimal circumstances for the observation of the eclipse. To accomplish this, ECLIPSA 99 will collaborate with similar institutions both in and out of Romania, with specialists from related fields, as well as with cultural, tourist and trade institutions. Funding will come from membership dues (US $40 per year for individuals, $200 for organizations), as well as from donations and bequests. ECLIPSA 99 will continue to be active after the eclipse, when its main purpose will be to keep alive the interest in astronomy.

Considering that the last eclipse of this millennium is a European eclipse, we are pleased that the Council of Europe approved ECLIPSA 99, and placed it under its patronage. The International Planetarium Society (IPS) is also supporting this project — especially the cooperation among European planetariums along the eclipse path.

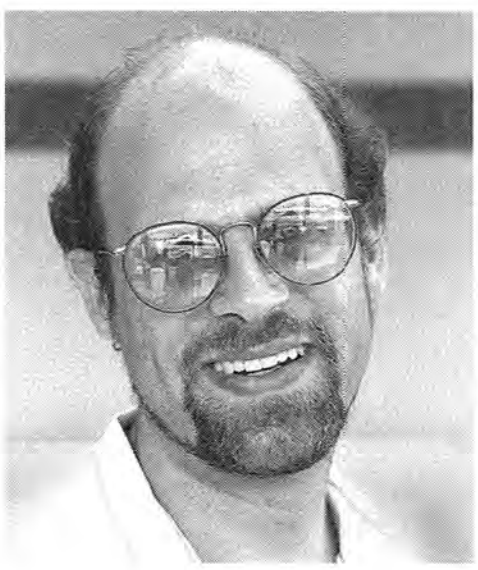
MAGDA STAVINSCHI
Astronomical Institute of the Romanian Academy



The Butler did it! The Commission 51 Bioastronomy medal.

Commission 51 Bets on Planets!

While some speculate about Brown Dwarfs or non-radial stellar oscillations, on Monday Commission 51 honored four astronomers for their pioneering work in detecting extra-solar planets.



Conceived in 1984, at the First International Bioastronomy Conference (IAU Symposium 112), this is the first time that the Commission 51 Bioastronomy Medals have been presented. The citations read:

Awarded to Professor Michel Mayor, Dr. Didier Queloz, Professor Geoff Marcy and Dr. Paul Butler on August 25, 1997, during The XXIIIrd IAU General Assembly, for pioneering work on the detection of extrasolar planets that resulted in a significant contribution to the advancement of our field.

Dr. Paul Butler personally received one of the medals at the start of JD-13. The remaining medals will be sent to the recipients at their home institutions.

JILL TARTER
President, Comm. 51

Sidereal Times

On-Site Submissions

Number	Author	Title
S183-200L	M. I. Wanas	A Pure Geometric Approach to Cosmology
S184-900L	H. Nonega-Mendoza & Christine Allen	Orbital Structure of A Galactic Potential
S184-901L	Nuritdininov, S.N., et al	Bulge and Bar: A possible way of their formation
S184-904L	Lepine Jacques	A model of the galactic disk with a hole in its center
S184-908L	A. P. Marston	Clues to the evolution of massive stars from their circumstellar environments
S184-914L	Fridman, A.M., Polyachenko, V.L.	Determination of the 3D Distribution function in nuclear star cluster
S184-915L	Fridman, A.M.	Whether detected systematic radial velocity in ionized disk is a new type of accretion?
S184-916L	Mayya, Y.D., Rengarajan, T.N.	Far-Infrared Emission and Gas to Dust Ratio in Discs and Central Regions of Galaxies
JD02-105L	Nisikawa, A.	The Influence to the Structure Formation by Delayed Formation of Dwarf Galaxy
JD02-106L	Klessen, Ralf	Dwarf galaxies without dark matter - results with two different numerical techniques
JD03-101L	Fridman, A.M.	Determination of the 3D Distribution Function in Stellar Clusters
JD03-102L	Fridman, A.M. et al.	Investigation of the dynamics of spiral galaxies on the base of 3D vector velocity field of their gaseous disks
JD05-100L	Fridman, A.M. et al.	Nonlinear Radial Laminated Flow (Laminated Pie) as a Manifestation of 3D Dynamics of Astrophysical Disks
JD06-100L	N. Gorkavyi et al.	Structure of the interplanetary dust cloud : some results of a novel approach
JD06-101L	Ipatov, S.I.	Migration of Small Bodies from the Kuiper Belt
JD07-102L	Assafim et al.	CCD positions of extragalatic radio soufces
JD07-103L	M. Miyamoto	A remaining rotation of Hipparcos Reference fr ictic interior motion ?
JD08-100L	Bobrowsky, M.	Recent Developments in the Young PN He3-1357
JD08-105L	Malawi, A., Kurdi, M. & Al-kharbovsh, H.	New timing of light minimum of VW Cephi
JD08-107L	A. Gimenez and A. Claret	Synchronization anomalies inesinisas ts aeolutionary processes
JD09-100L	Zhou Ai-hua, Wang Xin-dong	A probable new scientific case for large radio telescope
JD10-200L	Wang Haitao, Zhon Bifeng and Duo Qiufeng	Heterodyne hologram spectrometer research in laboratory and some discussions working with telescope
JD12-001P	H. R. Dickel	Recent Developments of the IAU Task Group on Designations as a Resource for Electronic Publishing
S183-212L	Treumann, R.A., Kull, A. and R. L. Mace	Suppression on Heat Conduction in the ICM
S184-801L	Hirabaysahi,H. & VSOP Team	First Results From VSOP
S184-917L	Feltzing, S.	Structure of the galactic bulge and inner disk populations ages and metallicties
S184-918L	Oya, H., et al	Confirmation of the Extremely Intense Decametric Pulsar with Dispersion of 240pc/cc in the Direction of Galactic Center Using the Interferometer Array System
S184-919L	Chou, Chih-kang & Ie Hwi Lin	Disk Models with Magnetic Field
S184-920L	Nitta, S.	Magnetospheric Structure filled with Relativistic Plasma Jets/Winds
S184-921L	Kameya, O., et al	A Possibility of Measurement of Distance and Proper Motion of Galactic Sources by using a Differential VLBI method of VERA
S184-922L	Chan, K-W., Moseley, S.	Detection of Far Infrared Excess in Arp 220
S184-922L	Chan, K-W., Moseley, S.	Detection of Far Infrared Excess in Arp 220
S184-923L	Chan, K-W., et al.	Dust composition, energetics, and morphology of the Galactic Center
S184-923L	Chan, K-W., et al.	Dust composition, energetics, and morphology of the Galactic Center
S185-918L	P. Cugnon	The sunspot index data center
SPS3-00L	E. Rodriguez et al.	Photometric observations of Comet Hale-Bopp
S185-511P	Shiuji Koide	Numerical simulation of general relativistic MHD of jet formation in black hole magnetosphere
JD14-100L	P. Callanan et al.	A search for the IR Counterpart of 4U 1630-47
JD18-100L	Chou, Chih-kang & H. S. Lu	Inverse Compton Scattering in Magnetic Field
JD24-100L	Arnold O. Benz	X-Ray/Radio Network Flares of the Quiet Sun
S188-501L	Fienga, A.	Impact of Hipparcos Data on Astrometric Reduction
S188-502L	M. Mijatovic	DIAGNOSTIC OF ASTROPHYSICAL PLASMA IN NEIGHBORHOOD OF NEUTRON STARS
S188-503L	E. Regos and N. Masetti	SXTs are like ER UMa CVs
S188-504L	V.V. Fomichev et al.	On the SORS project of CORONAS I and F
S188-505L	D. Maceagni	The VIRMOS project
S186-300L	Goudfrooij, P. & Trinchieri, G.	X-Rays, Ionized gas, and dust in NGC 5846
S188-503L	Katalin Balla	Transition probabilities for 1H in strong magnetic fields

Late Submissions

Number	Author	Title
JD01-020L	S. Pellerin et al.	Application of the (0,0) Swan band spectrum for temperature determination
JD06-043L	K. Muinonen and J.S.V. Lagerros	Inversion of statistical shapes of small solar system bodies
JD06-044L	Boice, D.C. & Benkhoff, J.	Dusty Coma Model of D/S-L 9 Fragments
JD08-062L	M.Parthasarathy	SAO 244567 (Hen1357): a post-AGB star which has turned into a planetary nebula within the last 20 years
JD08-063L	Young W. Kang & Edward F. Guinar	Light Curve Variations of the Old Disk Eclipsing Binary R Canis Majoris
JD13-020L	T K Chatterjee and V B Magalinsky	Circularization of Planetary Orbits During Plane t Formation
JD13-021L	J-Z Huang	Two Mars-sized planets collision and separation to form Mercury-like satellites and pl:metoids
JD15-042L	D.K.Chakraborty, D.K.Sahu and Parijat Thakur.	Dynamical Modeling of some Elliptical galaxies
JD15-043L	M. Yuasa, W. Unno, and S. Magono,	Distance Determination of Mass-losing Stars
JD15-044L	Hong-Suh Park, Hyouk Kim, Jun-Tae Kim, and Jeong-Sun Lee,	Analysis of the second-order extinction coefficient on CCD photometry of M
JD15-045L	Baumgardt, H. & Wielen, R.	Evolution of Globular Cluster Systems in Galaxies
JD18-052L	F. Makino	X-ray Variability of BL Lac Objects
JD20-100L	F. Querci	The NORT project
JD24-048L	Walker, W.S.G. et al.	Periods of southern Mira stars
JD24-049L	Coude du Foresto, V. et al.	Morphological changes in giant and supergiant M-type variable stars: interferrometric observations with FLUOR at IOTA
JD24-050L	Rezania, V. & Sobouti, Y.	Gravitationalwave modes, a fourth category of oscillations in relativistic stars, in post-Newtonian approximation
S183-156L	Baker, J.C.	CAT and the Doppler Peaks
S183-157L	Nasiris, S. & Rezania, V.	Distribution and evolution of quasars
S184-801L	Hirabaysahi,H. Inoue, M. & VSOP Team	First Results From VSOP
S184-802L	D. Rouan et al.	A close look at NGC1068, Mkn231 and NGC7469 with Adaptive Optics: dust torus and super-clusters unveiled
S184-803L	Ambartsumian, V.A. Khachikian, E. Ye, et al.	A new mechanism of origination of additional components in hydrogen emission lines in the spectra of AGN
S184-804L	Khachikian, E.Ye, et al.	Rapid variation in Broad H-b Profile of the Radio Galaxy 3C 390
S184-805L	Rocca-Volmerange, B.	Spectral Evolution of dusty starbursts and inner ellipticals at high z
S184-811L	I.I.Pronik	Observational data implying the NGC 1275 nucleus complexity
S184-812L	A. S. Cotera, M. W. Werner, P. P. Plavchan	MIR imaging of Sgr A*: Confirmation of the detection at 8.7 mm
S184-813L	E.Becklin and M.Morris	SOFIA: The Stratospheric Observatory for Infrared Astronomy
S185-501P	Audard, N. et al.	The acoustic cut-off frequency of A to F stars
S185-502P	Baldry, I. et al.	Radial velocity oscillation measurements of the roAp star alpha Cir
S185-503P	Hua, C. et al.	C.O.R.O.T. A space experiment for asteroseismology
S185-504P	Hubrig, D. & Mathys, G.	The single life of rapidly oscillating Ap stars
S185-505P	Mathys, G. & Hubrig, D.	Magnetic properties of rapidly oscillating Ap stars
S185-506P	Monteiro, M. et al.	Seismic detection of boundaries of stellar convective regions
S185-507P	Monteiro, M. & Thompson, M.	On the seismic signature of the HeII ionization zone in stellar envelopes
S185-508P	Pilachowski, C. et al.	The Procyon campaign: Observations from Kitt Peak
S185-509P	van Kerkwijk, M. et al.	The convection zone of whight dwarfs inferred from time-resolved spectroscopy
S185-510P	Wu, Y. & Goldreich, P.	Amplitudes of pulsations in variable white dwarfs
S185-511P	Li, Z. & Ding, Y.	Detection of possible ossilations in contact binary AU Ser
S185-601P	Deng, L. et al.	Turbulent convection and pulsational stability of variable stars I. Oscillation of long period
S185-602P	Deng, L. et al.	Turbulent convection and pulsational stability. II. Oscillations of RR Lyrae and Horizontal Branc
S185-603P	Hao, J.	MUSICOS 1996 campaign on the delta Scuti star V 880 Tau
S185-604P	Dziembowski, W. & Jerzykiewicz, M.	Asteroseismology of the b Cephei star 12 DD Lacertae
S185-605P	Kurtanidze, O. & Nikolashvili, M.	A high speed photometric survey of normal and peculiar A-type stars
S185-606P	Liu, Z. & Sterken, C.	Spectroscopy of the b Cephei star BW Vulpeculae
S185-607P	Poretti, E. et al.	g-mode pulsators on the cold border of the instability strip
S185-608P	Poretti, E. & Pardo, I.	Frequency analysis of the light curves of the galactic Double-Mode Cepheids
S185-609P	Roxburgh, I. & Vorontsov, S.	Asymptotic description and the diagnostic properties of low-degree stellar p-modes
S185-610P	Schrijvers, C. & Telting, J.	Spectral line-profile variability as a probe for l and m
S185-611P	Shibahashi, H. & Aerts, C.	Asteroseismology and Oblique Pulsator model of beta Cephei
S185-751L	Garcia, R. & Palle, P.	High Frequency (>5.5 mHz) Signals in GOLF Data
S185-851L	Chechelnitsky, A.	Inside the Sun, Heliosphere, Stars: Rhythms Genesis and Megaspectroscopy
S185-852L	Liza van Zyl and Brian Warner	Discovery of non-radial pulsations in the white dwarf primary of a dwarf nova
S185-853L	S. Parhi and T. Tanaka	Coronal Heating Mechanisms in the Presence of a Flow: A Numerical Approach
S185-854L	E. Khutsishvili & T. Kvernadze	Rotational Oscillation of Sunspots
S186-203L	C.J. Donzelli and M.G. Pastoriza	Optical spectroscopic properties of a sample of interacting galaxies
S186-204L	J. Baker and R. Hunstead	Associated absorption in high redshift CSS quasars
S186-205L	K. Glazebrook, R.G. Abraham and J. Bland-Hawthorn	A search for z=1.5 emission line galaxies in the Hubble Deep Field
S186-206L	M. Yun, L. Verdes-Montenegro, C. Del Olmo, J. Perea and P.T.P. Ho	CO and FIR study of Hickson Group Galaxies
S187-042P	Schonberner, D.	Hydrodynamically Based Overshoot Treatment & Nucleosynthesis in AGB Stars
S187-057L	Aoki, W.	Nitrogen Abundance in Oxygen-Rich Giants Through K to Late M
S187-058L	Cen, R.	Chemical Evolution of the Intergalactic Medium
S187-060L	Feltzing, S.	A Detailed Abundance Analyses of 47G and K Dwarf Stars with [Me/H] > 0.10 dex
S187-062L	Israelian, G.	Cosmich Chemical Evolution
S187-063L	Kodama, T.	Evolution of the Colour-Magnitude Relation of Elliptical Galaxies
S187-064L	Lejeune, T.	Improved Library of Theoretical SEDs for Population Synthesis Models
S187-065L	Li, L.	A Non-Linear Effect Solution to the Solar Neutrino Problems
S187-069L	Ninkovic, S.	On the Origin of the Metallicity Distribution for the Globular Clusters of the Milky Way Halo
S187-070L	Parthasarathy, M.	Chemical Composition of Post-AGB Stars HD 187885, HD 179821, SAO 34504
S187-072L	Peng, Q.	Electron Capture Rate Under Strong Electron Screening & Effect on SN Explosion
S187-073L	Rao, P.V.	How Important Algol Type Binary Stars Are to the Cosmic Chemical Evolution
S187-074L	Rebolo, R.	A New Survey of Li and Be Abundances in Metal Poor Stars
S187-075L	Rebolo, R.	Oxygen Abundances in Unevoloved Metal-Poor Stars
S187-076L	Sadat, R.	Spectrophometric & Chemical Models & the Effect of Metallicity
S187-077L	Sawicki, M.	Spectral Energy Distributions of z ~ 3 Galaxies
S187-079L	Shioya, Y.	Blue Elliptical Galaxies in the Hubble Deep Field
S187-080L	Shvelidze, T.	Spectroscopic Data Reduction System for Automated Quantative Spectral Classification of Stars
S187-084L	Zhao, G.	Chemical Abundance Patterns in Metal-Poor Stars
S188-282P	L.K. Ding T. Kobayashi, K. Mizutani, A. Shiomi, Y.H. Tan, T. Yuda and the other members of the Tibet ASg Collaboration	Search for 10 TeV g-Rays from the Nearby AGNs with the Tibet Air Shower Array
S188-400L	Isabella M. Gioia	The NEP ROSAT survey
S188-401L	V. Hambaryan et al.	ROSAT observations of Pleiades Flare Stars
S188-402L	Jan Kuijpers	A Solar Prominence Model
S188-403L	Rosina C. Iping	NEW IRRADIATED DISK MODEL
S188-404L	D. Hannikainen and Ph. Durouchoux	MULTI-WAVELENGTH TEMPORAL BEHAVIOR OF GRS 1915+105
S188-405L	Ennio Poretti and The JET—X Collaboration	The JET—X experiment on board of SPECTRUM RG satellite
S188-406L	Timothy R.Young, Ken'ichi Nomoto, Toshikazu Shigeyama, Tomoharu Suzuki	Adaptive Mesh Techniques For Calculating X-ray Light Curves In Supernova Remnants
S188-407L	M. J. Church, M. Balucinska-Church, K. Mitsuda, T. Dotani, K. Asai	Spectral Evolution During Dipping of the Low Mass X-ray Binary XBT 0748-676
S188-408L	M. Balucinska-Church, M. J. Church, T. Dotani, H. Inoue, K. Mitsuda, F. Nagase and A. Kubota	Spectral Evolution of the Thermal Component in Cygnus X-1 during Intensity Variation in the Soft State
S188-409L	M. Spada, M. Salvati and F. Pacini	A MODEL FOR RAPID VARIABILITY OF MKN 421

IS THE SKY FALLING?

Are there any asteroids that threaten the Earth? Unfortunately, we don't know. We are safe enough from the Earth-crossing asteroids already discovered, but we can't say anything about the collision dangers from those not yet found (and these are the great majority, even for objects with diameters greater than 1 km). This is a question that only astronomers can answer, but at present only a handful are involved in searches — fewer than the staff of a typical McDonald's Restaurant.

Just a few weeks before the previous IAU General Assembly, the world watched in fascination as Comet Shoemaker-Levy 9 crashed into Jupiter. This seemed like a wake-up call to the possible danger of planetary collisions. Ironically, however, the number of teams searching for Near Earth Asteroids (NEAs) has *declined* since 1994. Both the Australian survey and the search carried out at Palomar Mountain by Gene and Carolyn Shoemaker have been terminated. While several powerful new search systems are under development, there is no sign yet of an increased discovery rate for these objects.

While astronomers and policial leaders have been slow to respond to SL-9, the entertainment world got the message of 1994. Several TV specials on asteroid collisions were shown earlier this year, and at least two major motion pictures are in production. The cost of these fictional accounts greatly exceeds the required funding for a complete survey of NEAs down to 1 km diameter. Perhaps we should ask the producers of these films for a small share of their profits to deal with the real asteroid danger. Unless we take some action, the likely warning time for the next impact, if it should happen soon, is zero — the first we would know is when we feel the ground shake and watch the fireball rising over the horizon.

The IAU Working Group on Near Earth Objects meets at 9 am tomorrow, Tuesday, barring any major collisions in the meantime.

DAVID MORRISON
NASA Ames Research Center

IAU Symposium No.188:
The Hot Universe

The present decade is opening new frontiers in high energy astrophysics. After the X-ray satellites in the 1980s, including Einstein, Tenma, EXOSAT and Ginga, several satellites are, or will soon be, simultaneously in orbit offering spectacular advances in X-ray imaging at low energies (ROSAT; Yohkoh) as well as at high energies (GRANAT), in spectroscopy with increased bandwidth (ASCA; SAX), and in timing (XTE). While these satellites allow us to study atomic radiation from hot plasmas or energetic electrons, other satellites study nuclear radiation at gamma-ray energies (CGRO) associated with radioactivity or spallation reactions.

These experiments show that the whole universe is emitting high energy radiation, hence we call it the "hot universe." The hot universe, preferentially emitting X- and gamma-rays, provides us with many surprises and much information. Star formation, for example, has been viewed as a cold phenomenon for half a century. The temperatures of molecular clouds are a few tens of Kelvin, circumstellar disks are perhaps a few hundred, and young star surfaces are a few thousand Kelvin. However, X-ray observations have revealed that these "cool objects" possess gases of a million to nearly a hundred million Kelvin.

X-rays from heavy elements have been found in every class of astronomical objects, even in the intracluster gas, indicating that the hot gas originating from stars is largely diffused out through the interstellar to intergalactic spaces. Since these heavy elements are in rather simple forms such as He-like or H-like, the abundance determination with X-rays may be reliable. This leads us to a more quantitative study of chemical evolution of the "hot universe." Owing to the advance of X-ray spectroscopy, questions arising from the abundance study now enter a new phase; *e.g.*, to what degree do the apparent metallicity values depend on the plasma conditions such as ionization non-equilibrium or resonance scattering? Why do elliptical galaxies exhibit metallicity lower than solar? What determined the abundance variations in cluster gas? Is there any evolutionary effect in the chemical abundances in distant clusters?

On the other hand, the high-quality astrophysical plasma data are certainly demanding reevaluation of the currently existing laboratory atomic data. Gamma-rays directly provide new information on the nucleosynthesis of heavy elements.

All these are discussed in Session 1, "Plasma and Fresh Nucleosynthesis Phenomena." After the synthetic view of "the hot universe," strategy for future missions will be discussed in session 2, "Future Space Programs".

We, then, divide the "hot universe" into two major regimes; the first is the category of compact objects — white dwarfs, neutron stars and gravitationally collapsed objects: stellar mass black holes or active galactic nuclei. The compact objects, with the release of their huge gravitational energy through gas accretion, emit X- and gamma-rays accompanied by violent and rapid time variability.

A massive star, after exhaustion of its nuclear fuel, suddenly implodes and creates a neutron star or black hole. An isolated, rapidly spinning neutron star emits X- and gamma-rays as well as high energy particles. Such neutron stars evolve to radio pulsars and, after billions of years, some may be reborn as X-ray emitting low mass binaries, and then may be recycled as millisecond radio pulsars. This evolutionary scenario with observational results for and against it is still debatable.

With the spatially resolved spectroscopy technique, synchrotron X-rays and inverse Compton TeV gamma rays were found from shell-like SNRs. This may give a breakthrough in the long-standing problem of the origin and acceleration of the cosmic rays. Thus SNRs and related subjects are one of the important major issues to be addressed.

The study of stellar black hole binaries has been greatly advanced by recent gamma-ray and radio observations. They show relativistic jets analogous to those observed in some quasars, hence are called "micro quasars." Some of them possibly exhibit electron-positron annihilation lines and serve as excellent laboratories in which to study the relativistic plasma.

Although the primary emission from the compact objects is not from thin hot plasma, the intense high energy photons make photo-ionized plasmas around the compact sources. Conversely, the surrounding gas modifies the incident X-ray spectra by either reflection, fluorescence or absorption. These are found in galactic compact sources and active galactic nuclei (AGN) including our own galactic center. Indeed, the spectacular ASCA image of the fluorescent iron line near the galactic center provides a possible scenario that our galactic center exhibited AGN activities in the past.

One promising discovery related to this subject is the gravitationally redshifted iron K-lines from some AGNs. These are key observations for determining the accretion disk structure and, hopefully, the metric around a black hole: whether Schwarzschild or Kerr metric, for example.

AGNs are the objects for which multi-wavelength studies are extremely important. Gamma-ray data, already suggestive, provide a clue to the high energy emission from the central jet engines. To all these issues, session 3, "Diagnostics of High Gravity Objects", is devoted.

The second regime is thin hot diffuse plasmas. It shows a hierarchy structure: from coronae and flares of the sun and stars, the hot interstellar medium including supernova remnants, to hot gas prevailing in galaxies, clusters of galaxies and perhaps even in inter-cluster spaces. Climbing the hierarchy scheme upward to a larger scale, the role of the hot gas becomes more dominant. Finally in the rich clusters, the mass of the hot gas exceeds the optically visible mass, hence the hot gas may carry most of the baryonic mass in the universe. The hot plasma, through its temperature and spatial distribution, traces the dark matter distribution. How large is the total mass of the galaxies and clusters? Is dark matter distributed hierarchically like the visible matter? How can we measure the dark matter distribution? Observations of cosmic hot plasma will give us clues to these questions. The X-ray data will be cross-checked by the optical data for the gravitational lensing clusters. Determination of the Hubble constant using the Sunyaev-Zel'dovich effect is a rapidly developing area in X-ray and radio observations. New results for these subjects are brought together in the last session, "Large Scale Hot Plasmas and their Relation with Dark Matter."

KATSUJI KOYAMA
Chairman, Symposium 188

Do We Need a New Edition of the IAU Style Manual?

The predecessor of the current IAU Style Manual was published in 1966 as section I of Part 2 of the *Astronomer's Handbook* in volume 12C of the *Transactions of the IAU*. It was prepared by J.-C. Pecker, then IAU General Secretary, and was given in French with the title *Manuel de Redaction* and in English with the title *Style Book*. Twenty years later, the task of preparing a revised version was passed to me when I was President of IAU Commission 5. The title was changed to *The IAU Style Manual* (1989), and it was published (in English only) as chapter 8 of volume 20B of the *Transactions of the IAU*. It was reprinted as a separate booklet with the subtitle *The Preparation of Astronomical Papers and Reports*.

The primary purpose of the manual is to give recommendations about the preparation of 'manuscripts' that are to be submitted for publication in printed form by the IAU, but it also gives general guidance applicable to publication in journals, in reports of institutions and in books.

The current manual is in need of revision to account for changes in publishing practices since it was prepared. It should also aim to give information that is relevant to the publication and presentation of astronomical results in other forms. In particular, is should cover publication in electronic forms, as well as submission in electronic or magnetic forms. It should also give guidance on the presentation of papers at conferences, either in audio-visual form or as posters. It might also give guidance for newspaper and magazine articles, which are read by persons who are not astronomers, and on the preparation of IAU resolutions!!

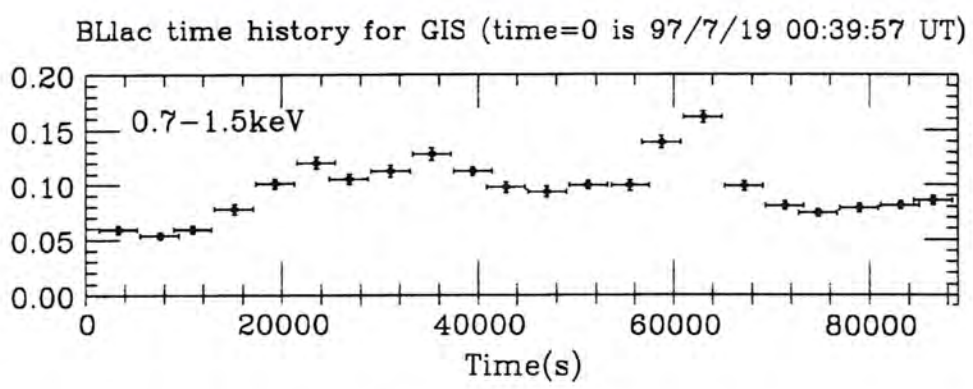
It is clear that the revised version should be made available on the Web, but consideration must also be given to those astronomers who do not have access to same. Its value should be increased by giving links to other sources of information that would be useful to authors and readers.

In the preparation of the new manual, particular attention should be paid to the requirements of readers whose first language is not English. Consideration should also be given to making available translations into other languages of some or all of the material.

The new manual should not only be useful to authors, editors, and publishers, but also should contain information that will be useful to the readers of publications. It could be described as 'the IAU guide to the publication and presentation of astronomical results,' but can you suggest a better short title?

Further questions, as well as information about the contents of the present manual and suggestions for additional topics are given in the poster paper 3AW2 J12-005P. If you are interested in any aspect of this matter, please put your comments in my mailbox by Wednesday afternoon, or send them by E-mail to g.a.wilkins@exeter.ac.uk. Better still, let me know how to reach you if you are interested in preparing a new handbook.

GEORGE A. WILKINS
Royal Greenwich Observatory (retired)



The soft X-ray light curve of BL LAC observed by ASCA in 1997. An extraordinary soft flare is noted 63,000 seconds into the observation.

Continuum Emission of Blazars:

Additional Special Session on the Initial Results of the 1997 BL LAC Multiwavelength Campaign

Joint discussion 18, High Energy Transients, will feature presentations on X-ray, gamma-ray, and multi-wavelength observations of blazars. Emission models will also be discussed. In his summary of the observations of gamma-ray blazars, Tadayuki Takahashi will summarize the results of the 1997 BL LAC multiwavelength campaign. This campaign will also be discussed more extensively during a special session entitled, "Initial Results of the Serendipitous 1997 Multiwavelength Study of BL LAC," which will take place on Thursday, August 28 from 13:00 until 15:00 in Room F.

Blazars are flat-spectrum, radio-loud AGN which display very large apparent luminosity, continuum dominated spectra that are thought to be comprised of synchrotron and inverse-Compton emission, and rapid variability at all wavelengths. About 50 of them have been observed by the EGRET instrument aboard the CGRO satellite to produce very high luminosities in the GeV energy band, and several are detected with ground-based Cherenkov gamma-ray observatories in the TeV energy band.

The emission is believed to occur in a plasma jet moving nearly in our direction at relativistic velocities. Multiwavelength observations potentially can be used to ascertain the conditions of the emission region in detail, and perhaps gain insight into the mechanism by which relativistic blazar jets are produced.

Optical observers noticed an outburst of BL Lac in June. Target of opportunity pointings with the XTE and ASCA X-ray observatories, and the CGRO gamma-ray observatory detected extraordinary flux densities and variability. During the 24 hour ASCA pointing, ~10 hours of ground-based optical monitoring occured. A correlation is apparent, but a definitive analysis is not expected to result because of the limitations of the optical data.

To provide for more complete optical monitoring during future multiwavelength campaigns, a "Blazar Whole Earth Telescope", or Blazar WET, is being organized. See http://bu-ast.bu.edu/~mattox/multiwavelength/wet.html for details. Differential CCD photometry with 1 meter class telescopes is the primary technique. Participation by additional observers at a diversity of longitudes and latitudes is solicited. The efficiency of the Blazar WET would benefit substantially from the incorporation into the Blazar WET of robotic ~1 meter telescopes at a few select sites around the world. It is expected that this WET would also be useful for studies of other transient optical phemonena.

The program for the BL Lac special session is:

Robert Nesci (Rome) *Italian Optical Monitoring of BL LAC during the 1997 Flare*

David Thompson (GSFC, USA) *Simultaneous Optical/EGRET Observations During the BL LAC Outburst*

Tadayuki Takahashi (ISAS, Japan) *ASCA Results for the 1997 Observation*

John Mattox (BU, USA) *The Correlation of X-ray and Optical Flux during the 1997 Flare*

Stephen Wagner (Heidelberg, Germany) *Optical Monitoring of Blazars*

JOHN MATTOX
(mattox@bu.edu)
Boston University

The Problem of the year 2000 or Cinderella and Sidereal Time

Many computer systems applications are going to fail at the moment 2000-01-01, T00:00:00, just two years and four months from the end of this General Assembly. Just like Cinderella's carriage, these computer systems will be transformed to pumpkins at the stroke of midnight! You should be concerned about your PCs, and you should be concerned about the computer software that computes your paycheck.

The FITS data format, which we use for interchange and archiving of our observational data, has a year-2000 problem. An IAU resolution reminds us that FITS, like so many other computer applications designed in the 70s and 80s, uses 2-digit years in date values. The IAU FITS Working Group has agreed on the new syntax for 4-digit years in date values, and the resolution urges all astronomers to implement the new syntax in their FITS reading and writing software soon in order to allow ample time for testing. See http://www.cv.nrao.edu/fits/documents/proposals/year2000.txt for the details of the new rules.

The year-2000 problem also occurs in telescope control software: one such system which was designed in the late 70s was tested recently by setting the year to 2000, and its computed sidereal time went negative and ran backwards! *All* software systems which use dates must be tested for year-2000 problems *now*, while there is still ample time to fix such errors.

DON WELLS
(dwells@nrao.edu)
Chair, IAU FITS Working Group

Talking Must Stop!

Minister Hirowa Namura has had it, up to, and including his ears. The ubiquitous automatic announcements in trains and buses, as well as the non-stop verbal din from vending machines and turnstiles, has got to stop. "I'm as good a listener as the next guy," Minister Namura claimed, "but we've got 120 million people in this country, and we don't need machines adding to the conversation."

The talking devices will be silenced beginning 1 October. They will be re-programmed to generate soothing sounds such as those associated with earthquakes and tsunamis.

Message for Commission Presidents and JD Organizers

At the request of the IAU General Secretary, Kluwer Academic Publishers has agreed to adapt the format for the materials to be published in the highlights. This will allow more text to be published on a page. The Latex style file needed for this purpose can be obtained from James Binney's anonymous FTP. Please access it in the following way: FTP jjb.thphys.ox.ac.uk. Cd IAU. Get jd.sty. Get jd.tex.

Please do not use this style file other than for the contributions to the highlights.

EUGENE DE GEUS
Kluwer Academic Publishers

Karasuma-dori this week. Need we say more?

IAU Symposium No.186: GALACTIC RESTRUCTURING

IAU Symposium 186, to be held during the second week of the General Assembly, will focus on the large body of new ground-based and spacecraft observations which implicate interactions in galactic activity (starbursts and AGN) and galaxy evolution, and on the latest theoretical models which unify these apparently diverse phenomena. The basic theme will be the development of a new cosmological perspective on interacting galaxies, tracing the effects of interactions from the current epoch back toward high redshifts.

Interacting galaxies are currently a 'hot' topic, of considerable general interest to studies of galaxy formation, active galactic nuclei, formation of star clusters, formation of tidal dwarfs, metal enrichment of the intergalactic medium, and galaxy evolution in both clusters and in the field. In just the past few years, HST has revealed unprecedented details of nearby interacting systems, clarified the nature of blue cluster galaxies at intermediate redshifts, provided tantalizing hints of interactions in some high-redshift QSOs, and just recently, has provided the clearest look yet at the formation/evolution of field galaxies out to z ~ 3 in the Hubble Deep Field (HDF).

On the ground, radio and millimeter-wave arrays are providing unprecedented detail on the spatial and kinematic distribution of the gas and dust in interacting galaxies. Theorists have responded to these new observations by developing sophisticated models treating the kinematics and dynamics of both the gas and stars, and have pushed beyond interactions of pairs and small groups to explore the effects of interactions in cluster environments.

The Symposium will open with three Overview talks setting the stage for the conference by outlining the major questions that have been raised by current observations and theory; Francois Schweizer will cover observations at low-z, while Roberto Abraham will cover high-z observations, and Carlos Frenk will discuss theoretical models. The second session stays close to home by discussing the wealth of new data that implicates current and past interactions and mergers in the formation and evolution of our Local Group of galaxies. The third session of the meeting discusses tidal interactions, drawing heavily on detailed observations of nearby systems.

The next two sessions discuss the role of interactions and outright mergers in the formation of 'hot' systems — elliptical galaxies and the spheroids of disk galaxies. Here the conference will examine kinematic and chemical evidence for accretion events in the formation of the Galactic halo, and make comparisons with the halo kinematics of nearby galaxies as revealed by studies of planetary nebulae and globular clusters. Among the issues which may make or break the connection between merger remnants and spheroidal systems are analyses of the origin of globular clusters, the formation of cores, and the dynamical structure of hot systems.

Sessions 6 and 7 will review the triggering of starbursts and nuclear activity by interactions and mergers. The environments in which galactic interactions occur will be examined in the eighth and ninth session. Here attention shifts to interactions seen at intermediate and high redshifts to begin building a cosmological perspective. Long-standing questions concerning the nature of the blue galaxies seen in intermediate-redshift clusters may soon be settled with high-resolution observations, which also constrain the pace of galactic interactions back to z ~1. Observations of the Hubble Deep Field, reviewed by Roger Blandford, will be highlighted as the single most important new evidence for how the field population has evolved from z ~2-3 to the present.

The final sessions of this conference will examine the entire observed redshift range, combining detailed studies of nearby objects with broad surveys of more distant sources. Simon White will give a summary of interactions, activity, and galactic evolution, while Peter Stockman will present the prospects for future new discoveries using the Next Generation Space Telescope.

DAVID B. SANDERS
Institute for Astronomy, Univ. of Hawaii

Notice from LOC

FREE bus service for the Banquet
wednesday 27

KICH 18:00 ➡
New Miyako H. 18:30 ➡
Miyako Hotel

Miyako Hotel ➡ Karasuma Oike
21:30-22:30

Accent on Acronyms

ACCURACY AND ACCOUNTABILITY FOR ACRONYMS

Who is responsible for making sure that designations conform to IAU standards?

Authors, referees and editors who consult the "IAU Recommendations for Nomenclature" on the Web at URL: http://cdsweb.u-strasbg.fr/iau-spec.html, and who also consult the "Clearing House" whose members and E-mail addresses are listed at the end of that document.

H.R. DICKEL
Chair, IAU Task Group on Designations

DID YOU KNOW that SETI is the only astronomy discipline known by its acronym?

Nara Invaded

On Sunday, about one thousand astronomers swarmed like camera-toting beetles into the hapless city of Nara on a free day-trip offered by the LOC. Nara, the first major capital of Japan, is known for its impressive collection of Buddhist temples and shrines, and is visited by tens of millions of serenity-seeking folk annually.

The *Sidereal Times'* roving photographer snapped these pictorial views while trying to keep out of the way of the highly-trained attack deer that are used to guard historic sites.

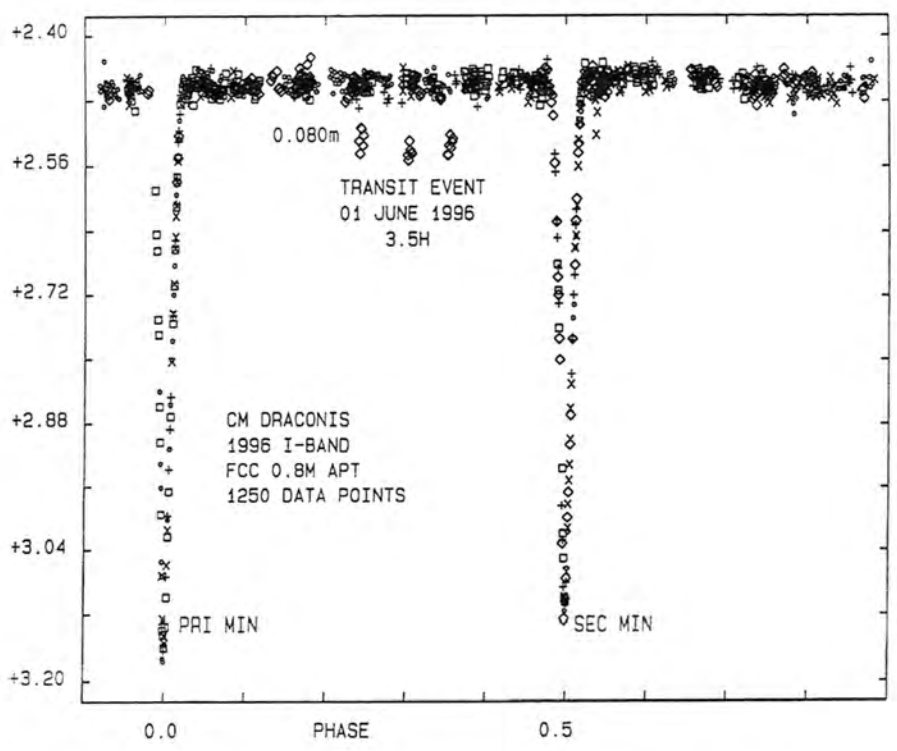
The Sidereal Times

Kyoto IAU 23

IAU XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

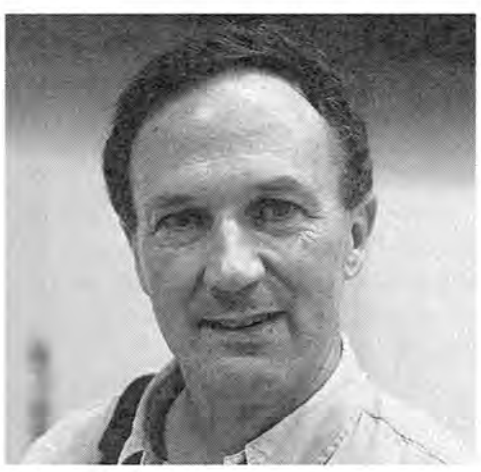
No.9: Wednesday, 27 August



Eclipsing binary light curve for CM Dra, showing the transit event of 1 June, 1996.

Jupiter-Size Planet Around CM Draconis?

We have made a possible photometric detection of a planetary, transit eclipse for the eclipsing binary star CM Draconis. CM Dra, a dM4.5+dM4.5 binary with a period of 1.268 days, was selected as a target for a planetary transit search, because its orbital plane is viewed almost exactly edge-on, and its component star radii are small. A planet orbiting the binary in the plane of the stars' orbit would transit across the stellar disks, producing a decrease in brightness proportional to the relative projected areas of planet and stars.



Ed Guinan

Photoelectric photometry of CM Dra has been conducted from 1995-1997 using the Arizona Four College Consortium 0.8 m Automatic Photometric Telescope (APT). During a 3.5 hr interval on 1 June, 1996, CM Dra was fainter by 0.08 mag in the I-band. Results of modelling the light decrease, assuming a planetary transit eclipse of the limb-darkened stars, produced good fits for a planet with diameter 0.90 ±0.04 that of Jupiter, and with orbital period 2.2 ±0.4 years. This estimated orbital period is close to the elapsed interval of 2.01 yrs between the transit event reported here and that noted by Martin and Deeg (IAUC No. 6425). An upper limit to the planet's mass of <5 M_{Jup} was made by searching for systematic variations of the eclipse arrival times of the binary that would occur in the presence of a massive planet or brown dwarf. Observations of additional photometric transits are needed to confirm the presence of a planet in this system.

E.F. GUINAN
(guinan@ucis.vill.edu)
Villanova University

Solar Seismology

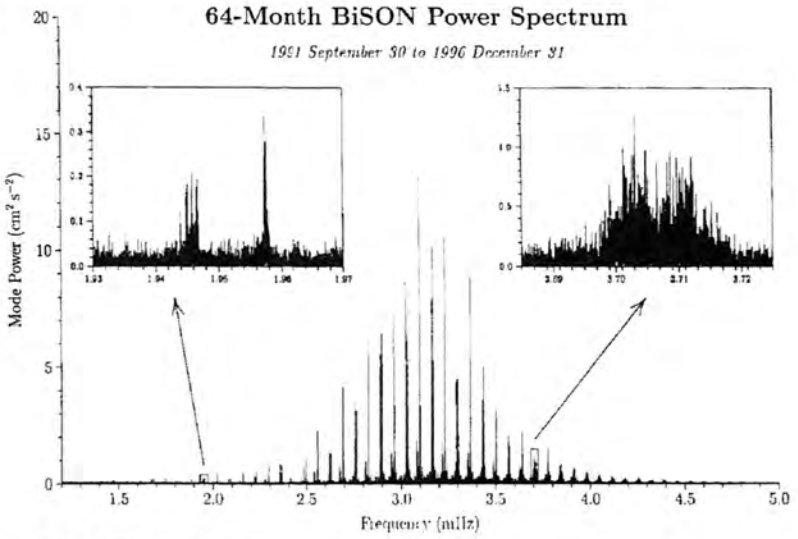
A global network of six observing stations (four automatic and two semi-automatic), equipped with sensitive and stable optical resonance spectrometers, are being used to almost continuously measure the velocity of the Sun and any global oscillations.

A rich spectrum of low l (l=0,1,2,3, and 4) eigenmodes of the Sun can be seen in the figure, having amplitudes ranging from a few mm per second to many cm per second. The fundamental radial mode is expected to have a period of about one hour, but has not been detected yet. The modes seen are high overtones (n=9 to more than n=30). We are measuring these eigenfrequencies to a level of 10 parts per million or better.

The left insert in the figure shows the 'fine spacing' between the singlet radial mode and the triplet quadrupole mode, split by rotation. Our view of the Sun along the solar equator reduces the 2l+1=5 lines to 3 only. The splitting implies a slowly rotating Sun, and allows a detailed comparison with solar models. These stand up admirably, and imply that the low solar neutrino flux is probably not due to a lack of understanding of solar structure. If the nuclear physics in the solar core is correctly understood, then the neutrino measurements, together with those from seismology, imply that neutrinos disappear between the solar core and terrestrial detectors. Neutrino oscillations or precession are possible explanations. Whatever the explanation, it endows neutrinos with new properties. This goes beyond the standard model of particle physics, and suggests that neutrinos have mass.

The right insert in the figure shows barely-resolved l=0, l=2 eigenmodes at a frequency where the linewidths are considerable. The numerous (stochastic) re-excitations at slightly differing frequencies during the course of months are clearly visible. These features are due to the Sun, and not to measurement noise.

G.R. ISSAK
Univ. of Birmingham, BiSON (Birmingham Solar Oscillations Network)

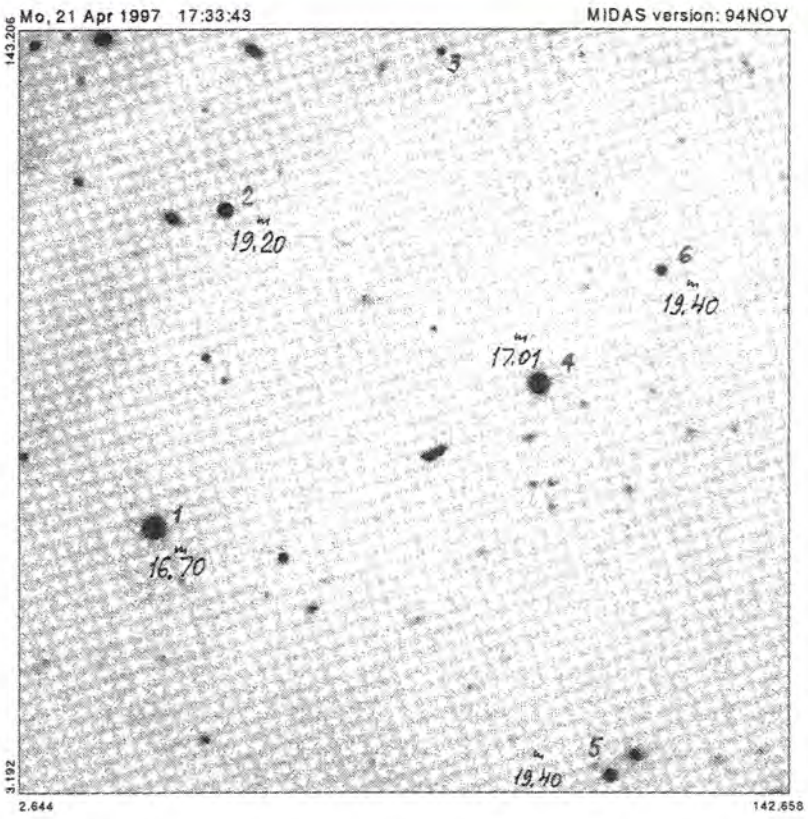


Notice from LOC

FREE bus service to the banquet
Wednesday 27 August

KICH 18:00 → Miyako Hotel (site of banquet)
New Miyako H. 18:30 →

Miyako Hotel → Karasuma Oike
21:30-22:30



CCD frame showing trailed image of new minor planet just below center.

Using CCD Frames to Find Solar System Bodies

For those who are looking for minor planets, existing CCD frames made for other astronomical purposes constitute an important resource. Although these frames are generally made for astrophysical research, both known and unknown asteroids could be found in them if they were made available to astrometrists. Typically, the frames could be used to determine the position, velocities, and brightness of all kinds of moving objects, and more particularly for discovering new Kuiper Belt minor planets.

In 1996, the Russian 6 m telescope observed three such minor planets. During observation of the distant 199SC, a new, main-belt asteroid showed up as a trail. The orbit of the asteroid has been determined using the Pulkovo Apparent Motion Parameters method. The Pulkovo Observatory and Institute of Theoretical Astronomy have developed software for the determination of ephemerides of any moving objects in an interactive mode. This software lends itself to analysis of archived CCD frames. Not only can this system be used to find new bodies, but astronomers who find a trailed object on their frames could quickly learn if they have discovered a previously-unknown minor planet.

If you are interested in the use of archived CCD frames for finding new solar system bodies, please contact the authors.

OLEG BYKOV
Pulkovo Observatory
RICHARD WEST
ESO, Garching

Bringing the Public on Board with Robot Telescopes

The Model T Ford transformed personal transport. The Model T telescope is a robot with CCD cameras for imaging and photometry, accessible on the Internet with a 1 meter aperture, and a price tag of $200,000.

Model T Robot telescopes will exploit and develop the immense interest of the public in astronomy. The first robot telescope was inaugurated by the University of Bradford in the UK in December, 1993. It has proved itself by operating for four years on a site with severe weather problems. Telescope access is available to all through the Internet.

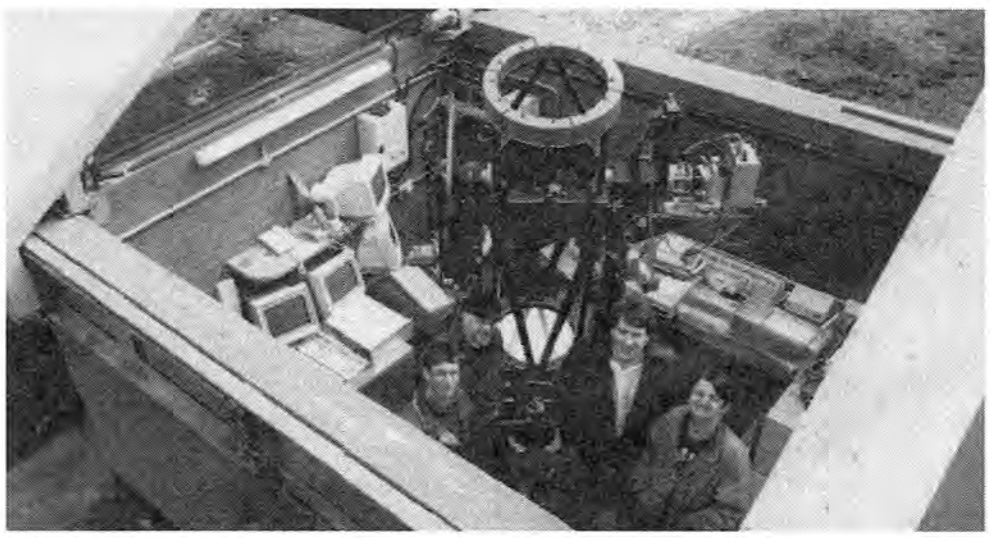
The Interface is intuitive and friendly, with reasonable default values. The telescope services observing requests, and returns data over the Internet. The astronomer can also 'eavesdrop' during the observations. In addition, it supports a program of astronomy education and image archiving. The Bradford robot hosts 20,000 visitors per week. Over 40,000 of them from 92 countries have registered as users and made observing requests. Others have followed the Bradford lead, and now there is a good understanding of the design and costs of the Model T telescope.

This summer a second Bradford robot telescope is being installed at the Observatorio del Teide on Tenerife in the Canary Islands. This telescope will have few weather limitations. The school projects will come into their own, with pupils around the world able to make requests in one lesson and receive the data in time for the next. Plans are afoot to enable students in Australia to eavesdrop on telescope observations designed to support the study of specific areas of astronomy like the HR diagram.

We hope to soon bring astronomy into the classrooms of the developed world using Model T telescopes. The public will also have access to such systems, and so will the astronomers. The new Canary Island telescope will be linked directly to the Compton Gamma Ray Observatory through the BACODINE collaboration to obtain optical counterparts to gamma burster events within 60 seconds of the burst detection in space.

Model T Robot telescopes have the potential to transforming astronomy by bringing the excitement of observing into the living rooms and classrooms of voters and potential voters.

JOHN BARUCH
(http://www.telescope.org/)
University of Bradford., U.K.



Preserving Small Observatories in Developing Countries

The diminishing availability of small (<2 m) telescopes at national facilities, and the chronic underfunding for the smaller public and private observatories, pose serious threats to the type of research and educational projects that can be undertaken in the 21st century. If current trends continue, the world's astronomers will have to contend with a relatively small number of increasingly oversubscribed large facilities.

Nowhere is this problem more acute than in the developing countries, where national facilities face outright budget crises or do not exist at all, and where small private facilities are few in number and often geographically isolated. If such facilities are to be preserved, and new ones developed for the next generation of astronomers, innovative strategies for operating and linking them must be developed.

In the U.S., the first few steps have been taken towards recognizing the important role small observatories play in modern astronomy, and ways in which they may be preserved. Some of these ideas can be found on the Web page from the workshop The Role of Small Telescopes in Modern Astronomy, a meeting held during 1996, October 14-15 at Lowell Observatory (http://www.noao.edu/aurastma/small_telescopes.html). Summaries of several other recent U.S. meetings on the future of small telescopes can be found via the links given at this site. Many of the courses of action posed at these meetings could be undertaken by astronomers in other countries where small observatories are threatened by economic, geographic or technological problems.

One of the most cost-effective strategies is to develop a Web site directory where astronomers can easily locate potential collaborating facilities with capabilities and instrumentation suitable for their projects. A prototype might be the North American Small Telescope Cooperative (NASTeC, http://www.nastec.org). An international equivalent could be useful for some countries, but many astronomers in developing countries would not have easy access to it. In all countries, however, new university consortia should be cultivated, and astronomers at economically disadvantaged observatories should be made more aware of avenues by which they may share solutions to educational, technical, or observational problems at little or no cost.

Some of these avenues are listed in my poster (JD20.002P). Joint Discussion 20 was devoted to the discussion of many issues that affect astronomers in developing countries.

T.D. OSWALT
Florida Tech.

Resolutions to be voted by the General Assembly at its second session

Hereafter we reproduce only the 4 resolutions which the Resolution Committee proposes to vote upon. Other resolutions, which will be mentioned or abstracted by the President of the Resolution Committee during his report, are not submitted to a vote. Either they are refereed for action to the Executive Committee, or they are covered by the so-called "blanket" resolution A8, as usual. They are A4, A6, A7 from Commission 5, C1, C2, C3 from Commission 50, C3bis from Division III, C4 from JD 22, C5 from WG on Planetary System Nomenclature.

Resolution A1

Protection of the Night Sky

The General Assembly of the IAU

Considering that

Proposals have been made repeatedly to place luminous objects in orbit around the earth to carry messages of various kinds,

that

the implementation of such proposals would have deleterious effects on astronomical observations,

and that

the night sky is heritage of all humanity, which should therefore be preserved untouched,

Requests the President

to take steps with the appropriate authorities to ensure that the night sky receive no less protection than has been given to the world heritage sites on earth.

Resolution A2

Proposal for Registering a New Acronym

The IAU

Recognizing

the many benefits that would follow from the clear and unambiguous identification of all astronomical objects outside the solar system to which reference is made in astronomical journals and other sources of data,

and noting

that the "Memorandum on Designations" (which accompanied Resolution C3-New Delhi) presented the basic FORM for designations, namely:

acronym sequence (e.g. NGC 6334, PSR J1302-6350)

that since the "Memorandum on Designations" was issued in 1985, much progress has been made which includes: the latest version, IAU Recommendations for Nomenclature, on the World Wide Web (WWW) with URL: http://cdsweb.u-strasbg.fr/iau-spec.html

and the on-line "Second Reference Dictionary of the Nomenclature of Celestial Objects" on the WWW with URL: http://astro.u-strasbg.fr/cgi-bin/Dic

and realizing

that much confusion still exists with duplicate acronyms and non-conforming designations appearing in the literature

acknowledges

the need for a voluntary registry of new acronyms where the entries are reviewed by the Task Group on Designations before publication to facilitate the discovery and elimination of potentially confusing and inadvertently non-conforming designations BEFORE they appear in print or in data archives,

that registering an acronym would be especially advantageous for large, ongoing surveys where images and source lists may be produced in stages and/or may be published in electronic form BEFORE the final printed catalogue,

that registering the acronym ensures the availability of a suitable, unique acronym for the survey and that the proposed designation conforms to the IAU Recommendations

endorses

the continued development by members of the Task Group on Designations of the Experimental Acronym Registry which is now part of the on-line "Second Reference Dictionary"

and supports

the efforts of the Task Group to encourage authors, referees, and editors to use this new tool to help guarantee that designations in future papers conform to IAU recommendations.

Resolution A3

On the need for archiving astronomical data

The XXIIIrd General Assembly of the IAU

Considering

the continuing important role of past astronomical data, including bibliographical information,

Considering

the phenomenal increase in these data,

Considering

the importance of their safeguarding and of their accessibility to the entire astronomical community,

Recommends that

the archiving of these data be an integral part of all major research projects and be taken into account by the editors of journals,

and that

astronomy archives be coded in the FITS format,

Supports

the continued maintenance of the Data Centers whose role in the distribution of information is of prime importance for astronomy, and their collaboration.

Resolution A5

On the modification of date values on FITS software

The IAU,

Recognizing

that the two-digit year numbers in the date values of keywords such as DATE-OBS = '31/12/99' in FITS files will become ambiguous on the day 2000-01-01,

And noting

that the IAU FITS Working Group has adopted new rules for DATExxxx value strings which specify that the previous convention applies only to dates in the range 1900-1999 and that the new convention DATE-OBS = '1999-12-31' is to be used in data interchange and in data archives beginning 1998-01-01,

Urges all IAU members

to ensure that their FITS writing and reading software is modified before 1998-01-01 to support both the new convention and the old convention, in accordance with the rules specified by the IAU FITS Working Group.

Buenaventura Suarez, S.J.

A Little-Known Pioneer

In the town of San Cosme y Damian, one of thirty Jesuit communities for Guarani Indians in the Great Province of Paraguay, lived an excellent, but little-known 18th century astronomer, Buenaventura Suarez.

Suarez was the first native astronomer from the southern regions of South America. He was born in Santa Fe on September 3rd, 1678, and studied at Cordoba. Both of these cities now lie in Argentina. He did most of his work in San Cosme, until his death in 1750. San Cosme is in present-day Paraguay.

With the help of local artisans, Suarez built various astronomical instruments, including a Kepler-type refractor, with lenses polished from local crystalline rocks, sundials, a quadrant with degrees divided to minutes, and a pendulum clock with minutes and seconds marked. In 1743, the Jesuit Order provided him with telescopes and two Martirion clocks, imported from England. The telescopes had focal lengths ranging from 2.2 to 6.5 m.

For 13 years, Suarez accurately observed eclipses of Jupiter's satellites. He also observed eclipses of the Sun and Moon. He corresponded with N. Grammatici at Amberg, N. L'Isle at St. Petersburg, I. Koegler at Beijing, and Pedro de Peralta at Lima. He made determinations of longitudes and latitudes for San Cosme and all Jesuit mission towns.

In 1743, he printed the first edition of "Lunario de Siglo", an astronomical calendar containing the phases of the Moon, solar and lunar eclipse, and church festivities. This publication was re-issued until 1856.

By order of King Carlos III, Jesuit priests and brothers were expelled from Spain and all of its colonies around 1767. Population of their communities in the Province of Paraguay declined. Time and military adventures took their toll, and today what remains are ruins, some sculpture, and a beautiful Mass composed by D. Zipoli. All the astronomical instruments of Father Suarez are lost, with the exception of a sundial at San Cosme which now serves as a lonely testament to this exceptional man.

Stamp showing Suarez's sundial. Kepler appears as well, but is largely irrelevant.

ALEXIS EMILIO TROCHE-BOGGINO
Univ. Nacional de Asuncion, Paraguay

Fermi Paradox Resolved!

The Japanese did not invent the vending machine, and indeed, they don't even like them. The now-ubiquitous machines were introduced to a little-known Tokyo suburb three decades ago for the purpose of making imbibitions such as cold tea and freshly-squeezed baseballs available to the populace even in the dead of night.

But what began as a public convenience has turned into the equivalent of Australian rabbits. The machines were over-engineered, and soon mastered the ability, predicted by Von Neumann, of self-replication. Hiro Hamasaki, of the Kyoto Bureau of Statistics, has estimated that by the year 2013, the number of vending machines in Japan will be sufficient to cover the country to a depth of 200 meters. Researchers aware of Enrico Fermi's famous question regarding extraterrestrials, "where are they?", now believe that the answer is standing on the street corner, patiently awaiting your spare change.

Waiting to replicate.

Sky Surveys WG, Commission 9

On August 22, the WG on Sky Surveys (WGSS) decided to renew itself and elected its officers for the next triennium. The WGSS is a continuation of the WG on Wide Field Imaging, itself a follow-up of the WG on Astronomical Photography. Since its beginnings, the WG operated within Commission 9 of the IAU (Instruments and Techniques).

The last name change for the WGSS was decided in 1996, when the Organizing Committee of the WG realized that "wide-field imaging" also included radio synthesis maps, X-ray images, etc. The multi-spectral aspect and the interest in multi-wavelength surveys arose from the understanding that while the collection of data may be different from band to band, ways of dealing with large amounts of data are similar.

The WGSS sees as its mission to bring to the attention of the astronomical community information related to full or partial sky surveys at any wavelength, including past, present, and future studies. We are aware that even this task may be presumptuous or too hard to accomplish, but we believe this information to be vital to the community, to prevent duplication of effort and to help in the optimization of survey studies and use of large telescopes or space missions.

The WGSS will work to provide information about available data to the astronomers. Already information on more than one million astronomical plates, archived at various observatories around the globe, is available on the Web through CDS, thanks to the efforts of M. Tsvetkov and colleagues in Sofia.

To summarize, the WGSS will emphasize the cross-spectral aspects of sky surveys, and will promote methods of analysis and archiving of terabyte-sized data sets. To help us, we invite astronomers to join our WG by E-mailing Noah Brosch or the WG Secretary (G.M. Richter, gmrichter@aip.de). You will be added to our mailing list and receive further information.

NOAH BROSCH
(noah@wise.tau.ac.il)
Chair, WG Sky Surveys

GERARD LELIEVRE
President, IAU Commission 9

SPS-2: ISO Results Pour In

Monday's special all-day session on the European Space Agency's Infrared Space Observatory (ISO) yielded a wide variety of new results. ISO covers the wavelength range from 2.5 to 200 microns with a camera, photometer, and low- as well as high-resolution spectrometers.

Among the most striking discoveries are: The discovery of hydrogen fluoride in interstellar space; the identification of forsterite — magnesium silicate crystals —in the atmospheres of the young star HD 100546 as well as in comet Hale-Bopp; and an OH absorption feature at 35 microns in the ultraluminous galaxy Arp 220, which has long been predicted to provide the excitation and line inversion responsible for powering this galaxy's megamaser emission.

Specific results from the camera and photometer include the detection of intracluster dust in Coma and a derived initial mass function for the Chameleon cloud suggesting a wealth of objects with masses in the brown dwarf range. These instruments have clearly demonstrated that the mysterious emission from interstellar cirrus clouds that IRAS has detected at 12 microns is due to Polycyclic Aromatic Hydrocarbons features and the continuum associated with it. Deep surveys have been carried out in a number of fields including the Hubble Deep Field. Counts at the faint end clearly show strong evolution in the infrared luminosity density comparable in strength with quasars.

In the Seyfert galaxy NGC1068 and the spiral NGC6946, the pure rotation spectrum of molecular hydrogen can for the first time be seen in several of the lowest transitions, including the long-sought lowest transition at 28 microns. In NGC1068, these indicate a gas temperature of 100 K and an amount of hydrogen at least as great as derived from millimeter studies of carbon monoxide. Either all of the molecular hydrogen is at this rather high temperature or else the cloud masses derived from CO studies will have to be revised.

ISO has shown itself to be an all-purpose instrument for detecting water vapor in interstellar shocks, the atmospheres of planets and oxygen-rich giant stars, and even external galaxies. None of these observations were possible before this versatile spacecraft's launch. Mid-infrared maps of far greater detail than previously available are being produced for virtually every kind of extended source, and photometric measurements and far-infrared maps are by now available out to 200 microns for thousands of sources. ISO's lifetime, as determined by the evaporation of the liquid helium coolant, was originally expected to be 18 months, but now appears to be 28 months. Consequently, exciting new data will continue to pour in until April,1998.

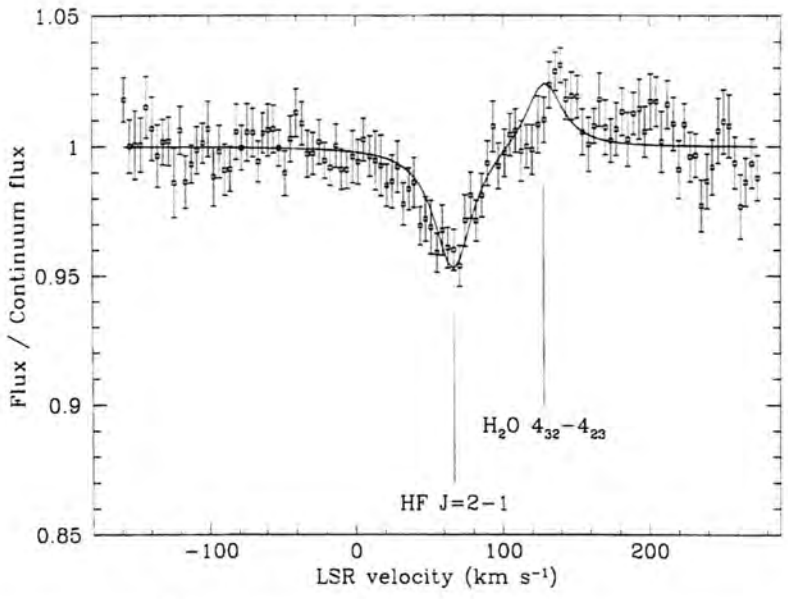
MARTIN HARWIT
Washington, D.C.
MARTIN KESSLER
ESA, Madrid

ALAIN ET COMPANIE

Ne vous y trompez pas. Avec ses fausses allures de cow-boy déguinguandé, nous tenons là un astronome chevronné, photographe de formation, découvreur par ailleurs de deux comètes. Alain Maury (c'est son nom) dévoue tout son temps et son énergie depuis près de quinze ans à l'astronomie observationelle que ce soit pour le deuxième "Survey" avec le Schmidt du Palomar, ou bien recherche des astéroides avec le Schmidt de l'OCA [Observatoire de la Côte d'Azur]. Son acharnement l'a même conduit à se blesser la jambe lors d'une observation, comme peut le confirmer Mr. Tomita qui était alors son associé.

Ainsi ne peut-il plus s'asseoir sur les tatamis en position traditionelle "Seiza." Peu importe il profite de son séjour au Japon avec toute sa famille, pour discuter avec les spécialistes d'observations CCD grand-champ et de surveillance des objets susceptibles de percuter la Terre (astéroides géocroiseurs). Son fils Ludéric sa fille Malvina et sa femme Carine, fervents amateurs, sont ravis de pouvoir visiter les installations très perfectionnées de leurs homologues Japonais.

JEAN SOUCHAY
Observatoire de Paris



HF absorption in the J = 2-1 line towards Sgr B2. Also shown is a water vapour emission feature (Neufeld et al., 1997).

A Note of Appreciation

I have participated in several of the volunteer-led tours organized by the LOC. It has been a pleasure to have the company of local people who have answers to all those questions we visitors ask about Japan. We have learned not only about the history and culture, but also about everyday living.

The tour guides were well prepared and organized, with lots of background material. Thanks are due to those who made all of these advance preparations.

I'm sure I speak for all those who have enjoyed the volunteer-run tours.

ANNA SCARFE
Victoria, Canada

The Astronomical Pro-Am Connection

What would we do without the amateur astronomers? They have been with us since our profession, the second oldest, began. The reason: so many stars and so much sky. But more recently, the luxury of having available a "dedicated telescopoe" — no scheduling problems, no peer reviews, no TACs. And recently, the availability of CCDs and sophisticated software (and fast computers).

The most spectacular amateur contributions have been, of course, the discoveries: comets, novae and supernovae, and now, in great number, asteroids. The discoverers have, at times, been put down as glory seekers (or as slightly daft — see a recent *Sky and Telescope* editorial), but really, they are seekers of new things, and we would know far less of how monster comets behave at large distances or what the behavior of novae and SN is at, or before, peak brightness without the help of amateurs.

And of course, there are the variable stars. Several very active societies, the AAVSO and the VSO League in Japan for instance, have been collecting, archiving and interpreting data for decades, and now that CCDs have arrived, UBVRI observations are becoming increasingly common.

Perhaps least realized is the advance in the field of astrometry, and every week amateurs from all over the world — mainly Japan, Italy, and the USA — are sending in positions accurate to ≃1 arcsec or better to the Minor Planet Center and the Central Bureau of Astronomical Telegrams. And to this can be added comet imaging — to detect and measure disconnection events and other unpredictable changes.

At the last meeting of the AAS, a full-day session was devoted to "fostering collaboration between amateurs and professionals." There it was stated, "ask not what amateurs can do for us; how can pros help?" First of all, that handy commodity money helps, as would gifts or loans of equipment, new, used, or mothballed. But also, amateurs like to be asked to help, and in recent years many have contributed to the successes of space telescope projects — from gamma rays to radio frequencies. Finally, nothing does more good than encouragment, praise, and well-placed words of advice. So we should all remember our unpaid or underpaid colleagues, and do whatever we can to help them.

WILLIAM LILLER
Instituto Isaac Newton, Santiago

"Redshift Surveys" in the 19th Century

On Monday, many of us enjoyed a successful Joint Discussion on "Redshift Surveys in the 21st Century." These surveys will teach us much about the evolution of galaxies and large-scale structure in the universe. Yet the study of large-scale structure goes back farther than one might imagine. The first accurate description of the Virgo supercluster was given by John Herschel in the mid-19th century. To paraphrase Sir John, "Virgo is the central condensation of a roughly spherical cluster of nebulae — our system lies outside the denser part of the clutser, but is involved with its outlying members — forming an element of some one of its protrubances or branches."

Victorian science might have beaten Hubble had more people believed John Herschel — and had he himself more confidence in his interpretation. Few were prepared to accept the "Island Universe" theory that it implied, and strong criticism followed. Moreover, Herschel was very reluctant to go against the beliefs of his revered father; William Herschel who, though once believing in "Island Universes" had in later life accepted that all nebulae were somehow gaseous condensations in our own system. Consequently, even John Herschel's textbook still stated the older, incorrect interpretation.

Richard Proctor, a popularizer of astronomy, was one of those critics of Herschel's Virgo 'Supercluster.' Yet Proctor also produced plots of the distribution of Herschel's nebulae over the sky. One of these is quite remarkable; in the Centaurus region, the galaxies are clearly seen to form long filaments surrounding empty voids — much the same as we see in modern day "redshift slices." The fabric of the universe, on its largest scale, had been revealed — long before the first redshift was obtained in the early 20th century. John Herschel had seen it too, and had made the correct guess as to the geometry of the Virgo Supercluster — but the general criticism of the "Island Universe" theory and his deep respect for his father — kept it for science to rediscover a hundred years later.

TONY FAIRALL
University of Cape Town

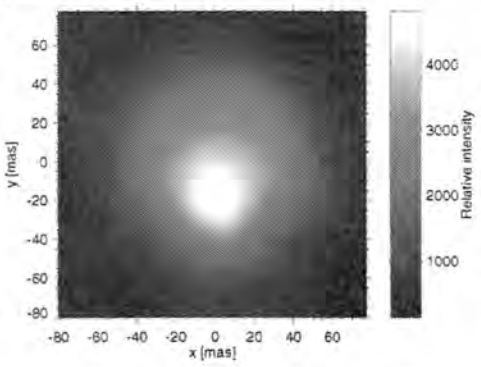
Betelgeuse Throbs!

New Hubble Space Telescope (HST) images of the stellar behemoth Betelgeuse are challenging standard, stellar models, and a surprising bright structure found in Betelgeuse's atmosphere may affect our understanding of the structure of stars.

The HST images suggest that a totally new physical phenomenon may be affecting the atmospheres of some stars. Instead of lots of little sunspots, such as we see on the Sun, we find an enormous bright area more than 200 K degrees hotter than the surrounding surface of the star. We saw these hot spots in both March, 1995 and October, 1996.

In addition, ultraviolet spectra reveal that the atmosphere is expanding, the star is rotating, and its axis of rotation can be identified. The bright hot spots appear to occur near the pole. Earlier IUE observations of Betelgeuse showed that the star has a 420 day period, during which it oscillates, or "rings" like a bell. The oscillations might cause shocks in the atmosphere that break through the surface near the rotation pole, causing the bright spots in the chromosphere.

UV photo of Betelgeuse showing atmospheric hot spot.



Additional measurements have revealed that Betelgeuse's extended atmosphere is about two times larger in the UV than in visible wavelengths. The star, about 425 light-years distant, is like a big, puffy cloud — 10 million times less dense than the Sun, but nearly one thousand times its diameter.

ANDREA DUPREE
(adupree@cfa.harvard.edu)
Harvard-Smithsonian Center for Astrophysics

MEGAN WATZKE
(mwatzke@cfa.harvard.edu)
Harvard-Smithsonian Center for Astrophysics

Astronomy on the Space Station?

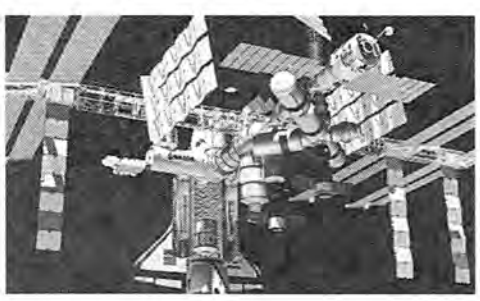
The International Space Station (ISS) is going to be built by the US, Russia, Japan, ESA (with 10 European countries), and Canada, starting in mid-1998 and with completion of the orbital research facility in 2003. It is important to note that the decision to build the Station has not been initiated by the science community, but has been primarily a political project. Nevertheless, the resources provided by the ISS to instruments onboard the Station can make it a very valuable tool for a broad range of disciplines, including space science and astronomy. A successful mission hinges critically on a vigorous utilization preparation, for this will ensure easy and frequent user access and, above all, user friendliness.

The ISS certainly is not equally suitable for all fields of astronomical research. It is a very general tool, and thus in specific areas is very limited. Users must take this into account. Disciplines such as solar monitoring, high-energy astrophysics, *in-situ* environmental monitoring, and use of 1 m class telescopes can benefit from the Space Station's regular access, ability to make in-orbit and post-flight calibrations, as well as its high level of resources and long (1 - 3 years) observing periods.

The European Space Agency (ESA) announced the first ISS flight opportunity at the beginning of 1997, and about 100 proposals for external instruments were received, among these several proposals in the field of astronomy. Presently, the proposals are being peer reviewed, as well as being technically assessed by ESA. Preliminary decisions on the European complement for external payloads will be made by end of 1997. Forthcoming "Announcements of Flight Opportunities" will be issued for, among other disciplines, astronomy payload accomodations on ISS by NASA, NASDA, RKA and, again, ESA.

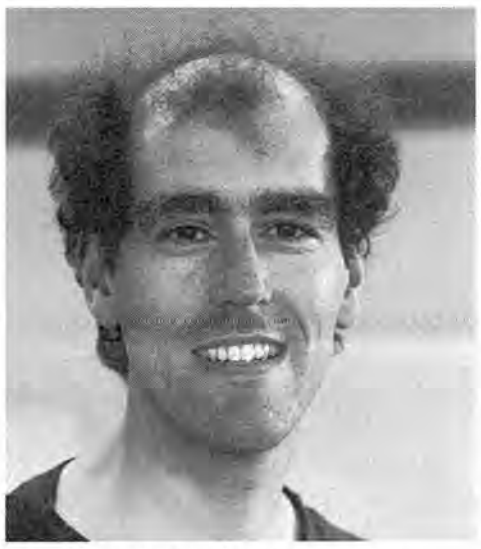
More information on ISS characteristics and flight opportunities can be obtained from the participating agencies (see above) as well as from European national agencies (*e.g.*, CNES, DARA, DLR, and ASI).

HARTMUT W. RIPKEN
(ripken@dara.de)
German Space Agency, Bonn



Counting the Days Until the Leonid Meteor Storm

It is only 450 days until debris of comet 55P/Tempel-Tuttle is expected to cause the most magnificent meteor spectacle that we can hope to view in our lifetime. Meteor storms occur frequently, but only this event can be anticipated with enough certainty to warrant making travel plans. The meteors are expected to be best viewed from Southeast Asia in November, 1998, with a possible repeat over Europe in 1999. Meteor astronomers will have a once-in-a-life-time opportunity to apply observing techniques that usually suffer from low detection rates for normal meteor showers, do unusual meteor astronomy, such as mid-infrared spectroscopy of meteors, and incorporate techniques that are a staple of atmospheric science, such as lidar.



Jenniskens is calm before the storm.

With the recovery of the comet as a +22 mag object on March 10 of this year, comet researchers are getting excited, too. They see meteor storms as an inexpensive opportunity to probe one particular comet for its main elemental composition, the dynamics of large grain ejection, and the morphology and fragmentation properties of relatively freshly-ejected grains.

In addition, proposals have been made to recover Leonid debris using capture cells on the MIR space station. The intent is to collect meteoroids in the stratosphere after the storms, in the hope of distinguishing Leonid dust from that of other sources.

Perhaps the most ambitious plan is to have a multi-instrument aircraft campaign to explore the 1998 and 1999 Leonid storms. MACs, as they are called, are a well-known tool of stratosphere research, but this would be a novelty in meteor astronomy. A consortium of meteor, comet, and upper atmosphere scientists have joined forces, and hope to observe the same meteors with a whole range of techniques. Their arsenal includes visual and mid-IR optical imaging, spectroscopic techniques, lidar, as well as simultaneous, ground-based radar.

The airborne mission would enable the researchers to be above the dreaded clouds, and to do mid-IR spectrosocopy and imaging. Recognizing the unique nature of the Leonid returns, the opportunity for meteor and comet science, and the unusual observing strategy for astronomers, IAU Commission 22 has accepted a resolution that specifically encourages the full employment of airborne platforms for the exploration of the Leonid meteor storm. A special meeting dedicated to this subject will be held on Wednesday, August 27, at 11:00 am in room C2.

PETER JENNISKENS
SETI Institute

Acknowledgments

The Local Organizing Committee and the International Astronomical Union gratefully acknowledge the financial and other supports from the following foundations and companies. Without them, the XXIIIrd General Assembly could not have been organized as it is.

Continued from No.1, 18 August and No.2, 19 August

Foundations:
Foundation for Promotion of Astronomy
天文学振興財団

Companies:
CONCURRENT NIPPON CORPORATION
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NISSAN MOTOR CO., LTD.
日産自動車㈱

Errata/Corrections:
Daido Steel Co., Ltd.
大同特殊鋼株式会社
Nisshin Steel Corporation
日新製鋼株式会社

Joint International Forum of Teaching of Astronomy

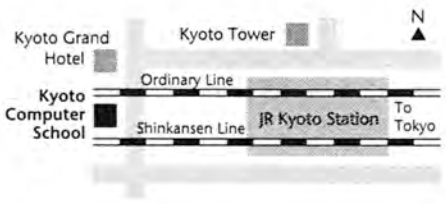
As usual, the Joint International Forum of Teaching of Astronomy will be held at the Kyoto Computer School on August 28. This forum is organized by Commission 46 of the IAU, and the Society of Teaching and Popularization of Astronomy in Japan.

The organizing committee for the forum invites you to attend, and to interact with local science teachers and science museum staff. The program is as follows:

11:00 - 18:00 poster papers on exhibit
13:00 - 18:00 oral presentations and open discussions
18:00 - 19:00 complimentary snacks and drinks

The Kyoto Computer School is located near the Kyoto railway station (see map), and the main lecture hall is on the 6th floor, with the computer rooms on the 5th. You can also call Dr. Kazushi Sakka at 075-751-0555.

SYUZO ISOBE
(isobesz@cc.nao.ac.jp)
National Astronomical Observatory



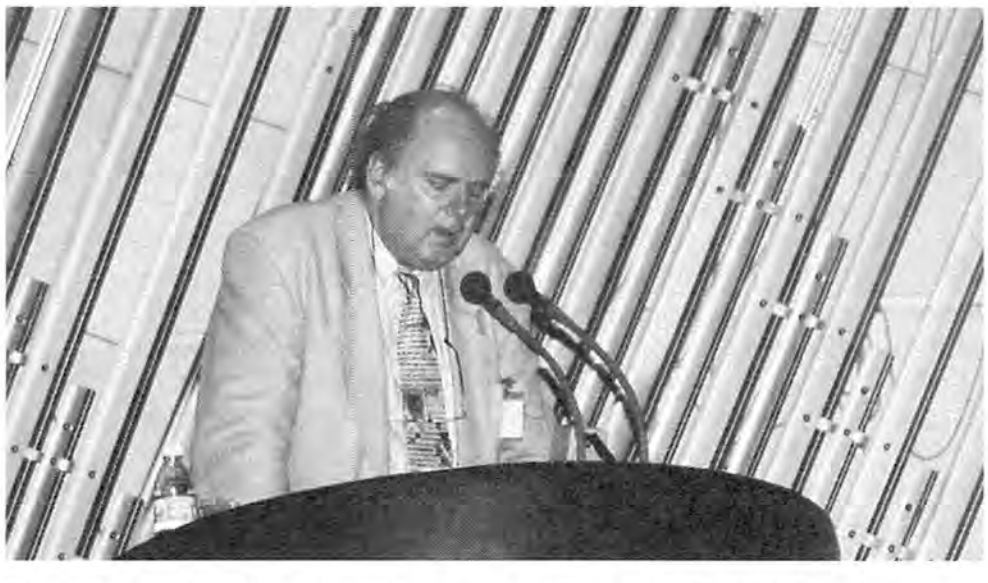
Light on Local Customs

You cannot help but notice that, in Kyoto, cellular telephones are as common as chopsticks, and used more often. Try walking down any of the city's shopping streets in the evenings, and you will be amazed to find these diminutive gadgets pressed to the ears of every third person. Most of those on the phone are female, and the question naturally arises, to whom is all this portable chatter directed?

A survey intended to enlighten readers on this important question has turned up the following: 65% of all phoning females are conversing with other women (most of whom are within 100 meters of the caller). 18% are calling the weather service, not because they are interested in the latest meteorological news, but only to look telephonically engaged. 4% are calling boy friends, 8% are ordering pizza, and the rest are using fake telephones that, if the correct sequence of buttons is pressed, dispense candy.

SETH SHOSTAK

Mayumi Handa and Chisato Ikuta order a squid pizza.



Brian Warner behind the lectern, discoursing on Cataclysmic Variable Stars.

The Sidereal Times

Kyoto IAU23

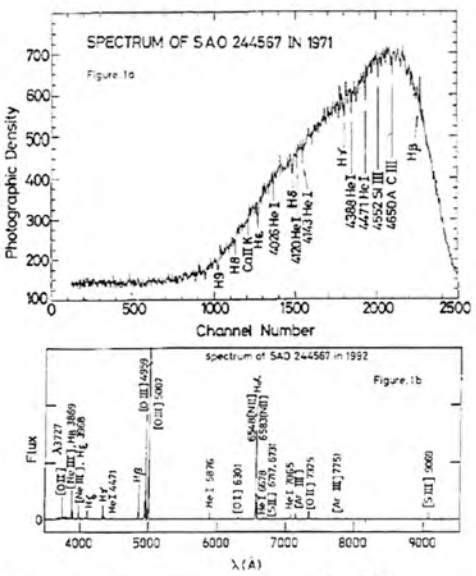
IAU XXIIIrd General Assembly - Kyoto 1997

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.10: Thursday, 28 August

Star Seen Turning into Planetary!

SAO 244567 (=Hen 1357) is a very young planetary nebula, recently discovered by the author and his colleagues. Based on a spectrum obtained in 1950, this object was classified as a B or A-type H-alpha emission line star. It is an IRAS source with far-infrared colors similar to planetary nebulae. The optical spectrum of SAO 244567 obtained in 1971 shows that it was a post-AGB B1 supergiant at that time. It has turned into a planetary nebula within the last 20 years.

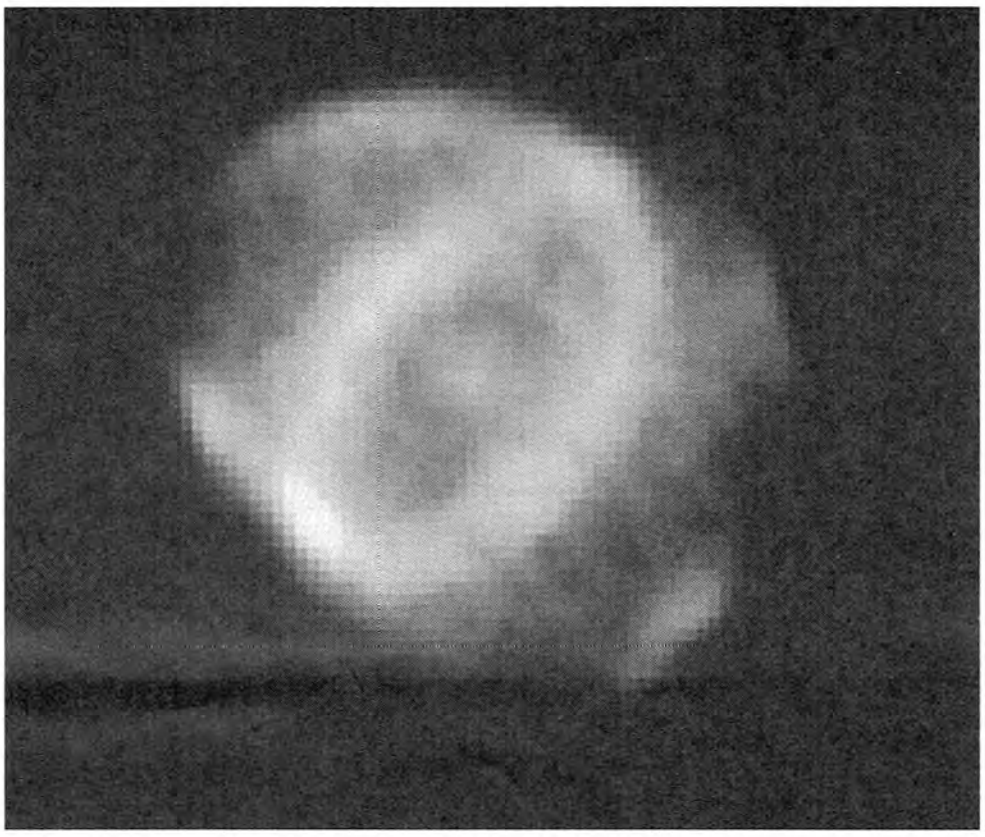


Optical spectrum in 1971 and 1992.

Recently, Bobrowsky obtained narrow-band, optically resolved images of this star with the HST Planetary Camera. The HST images in both H-beta and [OIII] 5007 Å show a well-resolved nebula surrounding the central star.

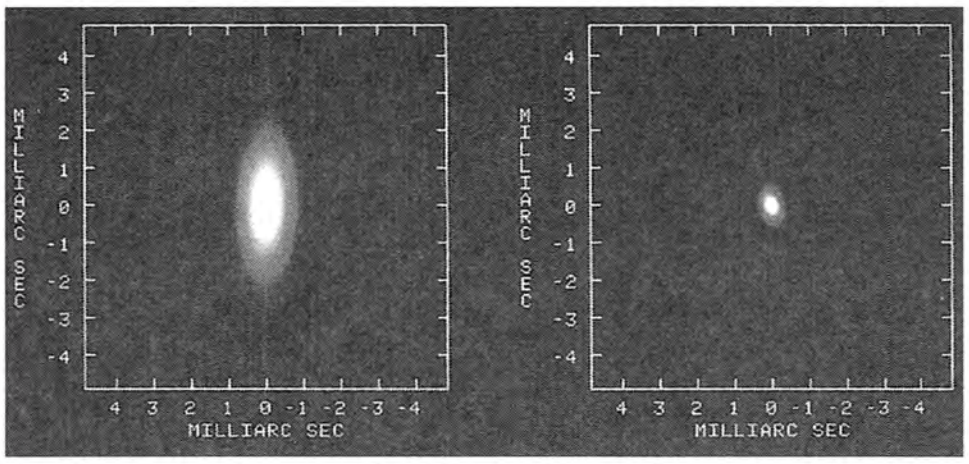
IUE ultraviolet spectra obtained during the last eight years show that the central star is rapidly evolving. It has faded by a factor of three within this time frame. The terminal velocity of the stellar wind has decreased from -3,500 km/sec in 1988 to almost zero in 1994. By 1994, the C IV (1550 Å) line, which was a P-Cygni profile with a strong absorption component, almost vanished. The [CIII] 1909 Å emission strength has increased markedly within 4 years. The UV nebular features show variations in strength, and this may be due to the fading of the

(Continued on page 3)



HST image of recently formed planetary nebula SAO 244567.

VSOP with HALCA Space VLBI



First 5 GHz images for quasar 1741-038 at z-1.054. On the right is a nearly point image with a resolution of 0.33 mas. The left image was made with the VLBA, and is shown for comparison.

The VSOP (VLBI Space Observatory Program) mission is led by the Institute of Space and Astronautical Science (ISAS) in close collaboration with the National Astronomical Observatory (NAO) of Japan. NASA/JPL, NRAO and the Canadian Space Agency (CSA) are key collaborating institutions, and most radio telescopes world-wide, including the VLBA, EVN, DSN and AT, will participate in VSOP observations.

Funding for development of the VSOP satellite, MUSES-B, was first received in April,1989. Because of the many new technologies needed for space-VLBI, ISAS selected the satellite as an engineering experiment, named MUSES, for the Mu-series Space Engineering Satellite. After the completion of engineering tests, the spacecraft will be handed to the scientific community for space-VLBI observations.

The 8 meter diameter radio telescope, in an elliptical orbit, will produce space to ground baselines up to 30,000 km. Over the 3 to 5 year lifetime of the mission, images from sources all over the sky can be obtained. The observing frequencies are 1.6, 5 and 22 GHz. The data are down-loaded in real-time on a 128 Mbps link to a dedicated five station telemetry network. The 10-station VSOP correlator at Mitaka, 20-station VLBA correlator at Socorro and 6-station S2 correlator at Penticton will be used for correlation.

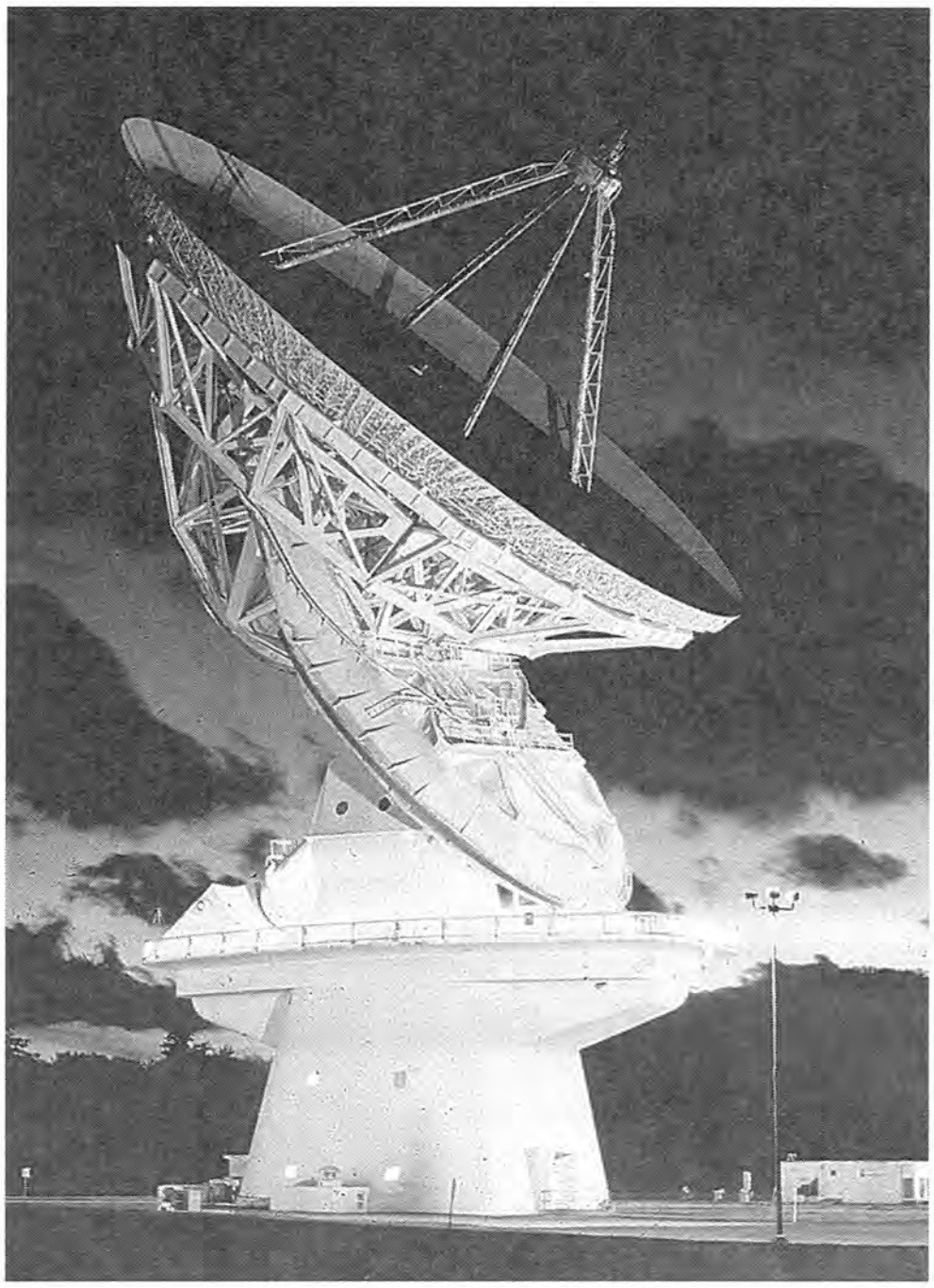
The satellite was launched from the Kagoshima Space Center on 12 February, 1997 by a newly-developed ISAS M-V rocket. During the first pass, we confirmed that the solar paddles and Ku-band antenna had correctly deployed. After launch, the satellite MUSES-B was named HALCA, the Highly Advanced Laboratory for Communications and Astronomy. In Japanese, HALCA (pronounced 'Haruka') means 'far away.'

Between 14 and 20 February three perigee raising maneuvers were conducted, increasing the perigee height to 560 km, with apogee at 21,250 km. The orbital period is 6 h 20 m.

(Continued on page 3)

Progress Report on SETI

The 140 foot telescope in Green Bank, searching for signals.



Shortly after the GA in The Hague, and almost one year to the day from the inaugural observations of NASA's HRMS SETI Project. Congress terminated funding for HRMS. The non-profit SETI Institute immediately began a campaign to raise private funding to continue the searches and The Planetary Society maintained its efforts. Through the generosity of a handful of major donors and a large number of smaller donations, Project Phoenix was born and other SETI observing projects have been upgraded. The fund raising enterprise continues, with the goal of raising $100 million to establish a Life In The Universe Endowment whose annual income can support continuing research and observations into the forseeable future.

Detailed information on SETI observing projects currently on telescopes can be found on the SETI Institute web site at www.seti.org. In brief they are:

Ohio State University Radio Astronomy Observatory - Sky survey operated by Robert Dixon and volunteers; it will be torn down at the end of 1997.

BETA - Sky survey, funded by The Planetary Society, operated by Paul Horowitz of Harvard University using two cassegrain feeds and a disc-cone to discriminate against RFI.

META II - Sky survey, funded by The Planetary Society, operated by Guillermo Lemarchand of the Argentine Institute for Astronomy.

SERENDIP IV - A "piggyback sky survey" funded by The Planetary Society, the SETI Institute, and private donors. Operated by Stuart Bowyer and Dan Werthimer of UC Berkeley at the newly-upgraded Arecibo Observatory.

Jill Tarter

SETI League - An effort to organize radio amateurs with satellite TV dishes into a global SETI sky survey initiated by Paul Shuch.

OSETI - A 10 inch optical home observatory in Columbus, Ohio operated by Stuart Kingsley and dedicated to looking for microsecond pulses.

Project Phoenix - A continuation of the HRMS Targeted Search, now funded by the SETI Institute, using two widely-spaced telescopes to follow up on candidates and discriminate against RFI. In 1995, Phoenix conducted 16 weeks of observing with the Parkes and Mopra antennas in NSW, Australia. It is currently observing about 25% of the time using the NRAO 140 foot antenna in Green Bank, WV and a resurrected ATT groundstation in Woodbury, GA. Future observational campaigns will see Arecibo arrayed with the Lovell Telescope at Jodrell Bank and the Nancay instrument paired with Dwingeloo.

JILL TARTER
SETI Institute

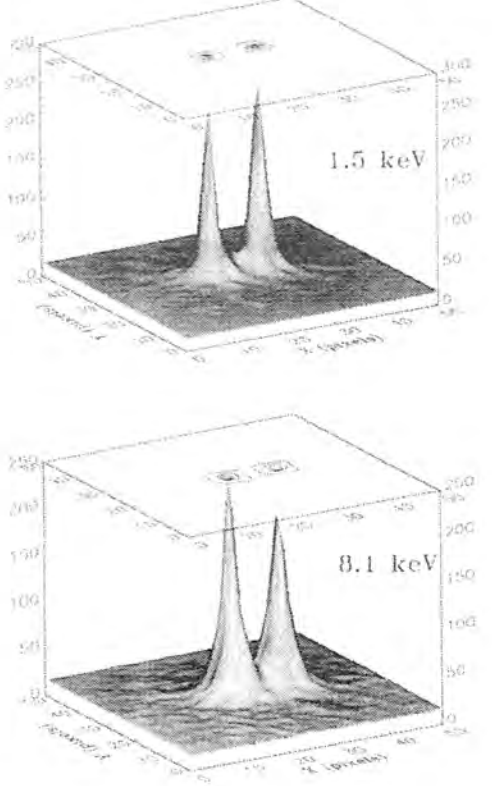
The JET-X Telescope Onboard the SPECTRUM X-RG Spacecraft

The astrophysical observatory SPECTRUM X-RG is a joint space project of more than twelve countries. It carries two different instruments based on grazing incidence optics for X-ray astronomy: JET-X (0.3-10 keV) and SODART (0.2-25 keV using different detectors). Besides the X-ray band, the SPECTRUM X-RG response extends toward the far-ultraviolet thanks to the FUVITA (91.2-120 nm) and TAUVEX (140-300 nm) telescopes, and towards the hard X-rays thanks to the MART-LIME coded mask telescope (5-150 keV).

The main characteristics are large collecting-area X-ray mirrors combined with good angular (ranging from ~ 20 arcsec to ~ 3 arcmin) and energy resolution ($\Delta E/E \sim 2\pm20\%$ at 7 keV, and $0.03\pm0.1\%$ with the Bragg spectrometer) detectors. This, together with the capability for observing sources over an extremely large energy band, will enable varied and unique scientific programs to be carried out. The other important capability of SPECTRUM X-RG is the ability to continuously monitor the full sky in the X-ray energy band 2-25 keV with 6 X-ray pinhole cameras (MOXE). From the existing catalogs, it is estimated that MOXE will monitor ~ 300 sources each day with a flux >2 mCrab in the 2-10 keV energy band. MOXE will also detect hundreds of gamma-ray bursts and locate them within an ~ 1°K error box.

The Joint European X-ray Telescope (JET-X) is one of the core scientific instruments. The project is a collaboration of British, Italian and Russian consortia, with the participation of the Max Planck Institut (Germany). JET-X is designed to study the emission from X-ray sources in the band 0.3-10 keV; in particular to meet primary scientific goals in cosmology and extragalactic astronomy. JET-X consists of two identical, co-aligned X-ray telescopes, each with a spatial resolution of better than 20 arcsec Half Energy Width. Focal plane imaging is provided by cooled X-ray sensitive CCD detectors which combine high spatial resolution with good spectral resolution, including coverage of the iron line complex around 7 keV at a resolution of $\Delta E/E \sim 2\%$. Each telescope is composed of a nested array of 12 mirror shells with Wolter I geometry, manufactured by an electroforming replica process. The total (2 telescopes) effective area of the X-ray mirrors is 330 cm at 1.5 keV and 145 cm at 8.1 keV.

E. PORETTI
Brera Astronomical Observatory, Milan



JET-X FM2 CCD images of two sources separated by 20 arcsec at 1.5 keV (upper) and 8.1 keV (lower).

New Capabilities at Westerbork

The Westerbork Synthesis Radio Telescope (WSRT) in the Netherlands is undergoing a major upgrade. It is being equipped with new front-ends that cover a large range of wavelengths, and a new 0.5 million-channel correlator, allowing high spectral resolution observations over a large bandwidth. The new front-ends will have cooled receivers at 3.7, 6, 13, 18 and 21 cm, and state-of-the-art, low-noise receivers at 49 and 92 cm.

All receivers are fitted into one front-end box so that changing frequency can be done quickly, and at any time. These systems will be available by the end of 1998. In addition, the new front-ends are equipped with a UHF broad-band system covering the frequency ranges 260-400 and 700-1,200 MHz. This UHF system is already operational and is a unique capability, especially designed for observations of redshifted spectral lines, in particular HI and OH. Some exciting new results have already come out of a first observing period conducted earlier this year, and can be found on the Web pages of the Netherlands Foundation for Research in Astronomy (http://www.nfra.nl).

The WSRT is an open facility and observing time is allocated on the basis of scientific merit by the NFRA Program Committee. For more information about the WSRT, see the Program Committee's Web site (http://www.astro.rug.nl/~nfra_pc) or contact the PC Chairman (undersigned) by E-mail or here at the IAU General Assembly.

J.M. VAN DER HULST
(vdhulst@astro.rug.nl)
Kapteyn Astronomical Institute, Groningen

Origami and Yo-yo

Origami: Square pieces of colored paper are artfully folded to make birds such as cranes, other animals, dolls, boats, etc., without using scissors or paste. You may get a sample of this traditional Japanese art made by some of the ladies at the registration desk.

Yumi Matsuda (right) and Miki Nakanishi making origami.

Yo-yo: Not what you think, a yo-yo is a rubber balloon containing a small amount of water, tied with a rubber string. You play with a yo-yo by bouncing it with your hand, as shown in the photo.

Naomi Katayama (left) and Sakiko Suzuki demonstrate playing with a yo-yo.

MASAHIDE TAKADA-HIDAI

Searching for Pale Blue Dots

Are there planets like Earth orbiting other stars? If such planets are within the "habitable zone" of temperatures, they may have liquid water and be suitable environments for life. But while finding Earth-mass planets is an exciting goal, the technology is daunting. While astronomers are encouraged by the accelerating discovery of giant planets using Doppler spectroscopy, we must turn to other approaches if we are to find objects that match Carl Sagan's description of our own world as a "pale blue dot" floating in space.

Dave Morrison

Perhaps the only technique that could find Earth-like planets today uses the precise measurement of their effect on starlight as they transit across the stellar disk. Statistically about1% of all stellar systems will be aligned so that such a transit can be seen from Earth, so we must observe a large sample of solar-type stars to be sure of making a significant survey. We must also achieve a high photometric precision of better than 0.01% to detect an Earth transit, requiring that the observations be made from space. On the other hand, what is necessary is only a modest and simple space telescope of about 1 m aperture, which stares continuously in one direction and measures the brightness of all the stars in the field — more than 100,000 if a rich field is selected. Further, the photometric stability required applies only on the time scale of a transit, which is less than a day. Longer term drifts in sensitivity or changes in the intrinsic brightness of the stars do not matter.

If such a dedicated telescope were placed in orbit, it could discover hundreds of planetary systems, assuming such systems are common among solar-type stars. As a relatively unbiased technique that is sensitive over a broad range of planetary masses, this mission will also tell us what the frequency of occurance is for planets of all sizes and orbits. The recent discovery of giant planets in short-period orbits already challenges our conventional ideas of how planetary systems are put together. We really don't know if other Earths are common, or if perhaps ours is a very unusual planetary configuration. Most of us would like to assume that there are many other habitable planets — but before we become too satisfied with this assumption, perhaps we should fly a small telescope in orbit that can provide an objective answer!

Photometric space telescopes have been proposed in both Europe and the United States, but none has yet been funded. In addition to the search for planets, such a telescope could provide fundamental data on stellar oscillations and structure. So far, however, the astronomical community has not reached a consensus on the value of such a mission relative to other priorities for space exploration.

DAVID MORRISON
NASA Ames Research Center

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Star Seen Turning into Planetary!

(From page 1)

central star, and possibly also the expansion of the nebula.

These results suggest that in the central star, the nuclear fuel is almost extinct as a result of post-AGB mass loss. The main stellar energy source may be gravothermal. Typical for hydrogen-burning AGB remnants is a very fast drop in luminosity by an order of magnitude when burning cannot be sustained any longer. These results suggest that the central star of this young PN is rapidly becoming a DA white dwarf. An alternative interpretation is that the present fading could be due to an episode of high mass loss, just now completed.

Assuming a distance of 5.6 kpc, the radius of the nebula is 0.02 pc. The expansion age is 2,700 years. The luminosity and core mass of the central star are 3,000 Lsol and 0.55 M_{sol}. The B-type supergiant spectrum suggests an effective temperature of around 20,000 K in 1971. The present effective temperature is near 50,000 K.

M. PARTHASARATHY
Indian Institute of Astrophysics, Bangalore

VSOP with HALCA Space VLBI

(From page 1)

The deployment of the 8 m antenna took place during tracking passes on the 27th and 28th of February. The six booms were extended 4.8 m, and tensioners then extended an additional 30 cm to deploy the gold-coated molybdenum mesh. This was one of the most important events after launch. On May 7th, the first successful interferometric tests between the satellite and the Usuda 64 m telescope were conducted with HALCA on PKS 1519-273 at 1.6 GHz. The data were correlated at the Mitaka correlator, and first fringes were found on 13th May.

The first image by space VLBI with HALCA and ULBI was successfully obtained on June 25 at 1.6 GHz for quasar PKS 1519-273. The first image at 5 GHz for quasar 1741-038 was obtained on July 20, and was reported during the IAU GA.

HISASHI HIRABAYASHI
Institute of Space and Astronautical Science, Sagamihara

Zooming in on Microlensing Observations

Research into faint stars using the microlensing technique now seems to be entering into its second phase. The reports on Friday, 22 August by Bennett and Udalski and also on the 25th by Bennett told us about future proposals for microlensing research. In principle the method can be used to study lensing objects with masses in the range 10^{-7} to10^{4} solar masses, including hunting for extrasolar planets as well as searching for massive black holes.

The mean duration of a macho microlensing event is theoretically expected to be proportional to the square root of the macho mass. Thus a mini-macho such as Jupiter would be observed for only a few days. The identification of an extrasolar planet using the microlensing technique can be made from a rapid spike in the light curve of a distant microlensed source star, and to do this reliably it is important to make repeated photometric observations several times during a given night.

This type of work would be difficult to carry out at just one observatory, as it requires almost continuous observation of the same source star as the Earth rotates. Continuous observations could be undertaken from the South Pole of stars in the Magellanic Clouds or the Galactic Bulge. Alternatively, it could be done by a cooperative program of southern hemisphere observations. Already two such collaborations have been organized for this purpose - one is the PLANET collaboration and the other is known as GMAN. These groups are combining photometric data obtained by telescopes at Sutherland, Perth, Mt Stromlo, Mt John and in Chile (ESO and CTIO). A beautiful dataset has already been obtained for the 95-30 microlensing event as a result of such a collaboration, and it is likely to become a classic case in future astronomy textbooks as the source star in the Galactic Bulge was resolved during the course of this event. The lens was probably a red dwarf.

In 1997, several interesting candidates were observed with complex light curves which may be indicative of extrasolar planets. Further analysis is still required to evaluate several possibilities, but at least these results show that microlensing is now entering a new stage and is opening up new possibilities for astronomy, as was the case, for example, with the birth of X-ray astronomy a quarter-century ago.

Japanese astronomers have also begun a microlensing project, known as the MOA project, which involves working with New Zealand astronomers. Observations were started in 1995 of the LMC, SMC and Galactic Bulge using a mosaic CCD camera with the 60-cm Boller and Chivens telescope on Mt John in New Zealand. In October a new CCD camera with three 3 cm x 6 cm SITe CCDs will be commissioned. The observatory latitude is 44 degrees S, which permits observations of the Magellanic Clouds to be made throughout the year, including during the winter months. The new project is expected to contribute greatly to the search for low-mass macho events.

YASUSHI MURAKI
Nagoya University

A Note on the MOA project

The MOA project is a new microlensing program which is now entering into its productive stage after about two years of development. MOA stands for Microlensing Observations in Astrophysics. As with other projects such as MACHO, OGLE and EROS, the primary goal of MOA is to search for dark matter in the galactic halo from the detection of rare microlensing events of stars in crowded fields of the Magellanic Clouds. MOA is a collaboration involving about two dozen Japanese astronomers from 8 different institutions (including Nagoya, Kyoto and Tokyo universities, the National Astronomical Observatory, and the KEK High Energy Physics Laboratory), and about a half-dozen New Zealand astronomers from four institutions (Auckland, Canterbury and Victoria universities and Carter Observatory). MOA is an appropriate name, as the moa is a massive 3-m tall flightless N.Z. bird, now generally believed to be extinct. Some ornithologists still search, however, for moas in the N.Z. forests, an activity that in some respects resembles macho searches in the Galaxy.

Observations are being made on a modified 60 cm Cassegrain reflecter at Mt John University Observatory at Lake Tekapo in the center of the South Island of N.Z. The telescope has been computer-controlled, and the focal ratio changed to f/6.25 with a new secondary mirror and three-component field lenses to give a wide, 1.3 degree field. Wide-band blue and red images are being taken in the LMC and SMC. Reductions are carried out both in Japan (Nagoya, ICRR) and New Zealand (Wellington) using the Dophot software.

We see MOA as a long-term project which will contribute significantly to microlensing research. Our ability to monitor millions of stars in the Clouds at all seasons of the year and to make repeated observations of a given field on the long winter nights are seen as competitive advantages. The new 24-million-pixel CCD camera, due later in 1997, will improve our current capability. Ultimately we see a larger dedicated telescope as essential for the future success of the MOA project, and we hope to be able to realize such an instrument soon.

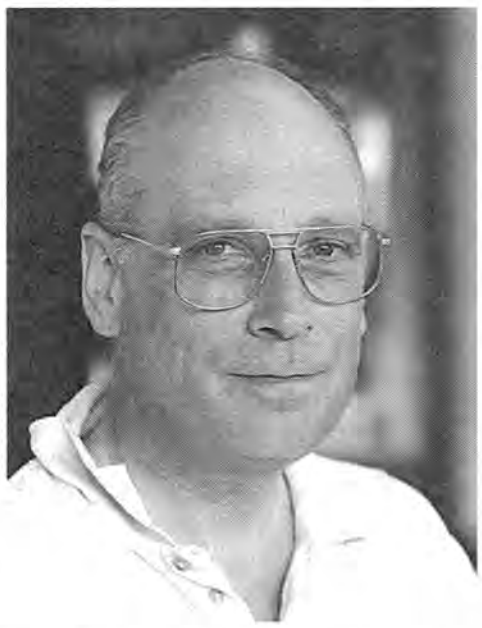
JOHN HEARNSHAW
University of Canterbury

Frequency is Money

It is estimated that by the year 2000, the commercial value of frequencies used for entertainment and mobile communication will be about US $2 10^{12}. About 25% of the radio spectrum below 275 GHz has been allocated to these uses, whereas about 2% has been allocated to radio astronomy. Radio astronomers are experiencing a steady increase of harmful interference from active users of radio. These facts underscore the challenge faced by passive scientific users of the spectrum in keeping the important radio windows open.

In addition to radio astronomy observations made within allocated bands, many are made outside as well. This well-known fact requires a coherent, well-organized defense of the allocated bands, because they are vital for proper calibration of radio astronomy instruments. Technical defense arguments are needed, as they are closer to the language understood by administrations and active users of radio: radio astronomy is often seen by them as an esoteric activity, or even science-fiction.

In a world where truth is expressed in money, the global counter-attack is led and coordinated by the URSI-IAU-COSPAR Inter-Union Commission on the Allocation of Frequencies, IUCAF. In Europe, the fight is led by the Committee on Radio Astronomy Frequencies of the European Science Foundation, CRAF. In the USA, by the Committee on Radio Frequencies of the National Research Council, CORF. A division for the Asia Pacific rim area is under construction, while mobilization is being coordinated in Africa and South America.



Titus Spoelstra doesn't want you to interfere.

In this battle, ammunition consists of a single, coherent position by radio astronomers when they speak with administrations and active users. IUCAF, CRAF and CORF battle on in various discussions and meetings in which they participate. They can only do this with adequate support and a sufficient number of active people. IUCAF, CRAF and CORF are recognized and well-known within ITU, CEPT, EU, and related organizations. Radio astronomers of all countries, unite!

TITUS SPOELSTRA
(http://www.nfra.nl/craf)
CRAF Secretary

Kyushu, the most southern of the four main Japanese islands, means "ninth island." The reason for this mis-numbering is unclear, but continental drift is one possible explanation.

Remarks of Incoming IAU President, R.P. Kraft

Bob Kraft

First of all, on behalf of all IAU members, spouses and friends, I want to express our sincere appreciation to those persons and organizations who made possible this especially productive General Assembly: to the members of the Advisory Board of the Host Organizations and its Chairperson, Dr. Yoshio Fujita, President of the Japan Academy, to the members of the National Organizing Committee and its Chairperson, Dr. Daiichiro Sugimoto, and to the members of the Local Organizing Committee and its Chairperson, Dr. Toshio Fukushima. Their hard work and attention to many details have been the major factors in making this GA so exciting socially, culturally, and scientifically.

As we approach the new millennium, our Union appears strong and, in my view, headed in the right direction. On the administrative level, the new Divisional structure admits of a close connection of the Division Presidents with the Executive Committee. This, for example, will greatly assist the EC in the process of rank-ordering proposals for future Symposia and Colloquia. On the scientific front, the integration of several timely Symposia with the GA yields an important new dividend: in what other venue could one explore, in the same assembly, an organized exposition of topics ranging from solar physics to cosmology? At the same time, the rule which insures a wide national representation on SOCs helps to maintain the truly international, and to a great extent unique, flavor of IAU-sponsored Symposia and Colloquia.

Returning to affairs of this GA, it was very impressive to hear the many excellent papers presented by our Japanese colleagues, and to recognize the increasing importance of the work of Japanese astronomers on the world astronomical scene. We are all aware of significant advances made here in space sciences, mm wave astronomy, and nuclear astrophysics. The completion of the Subaru Telescope on Mauna Kea and the recent launch of HALCA will provide new and virtually unparalleled opportunities for Japanese observational astronomers. We wish them good luck and "happy hunting" with the new facilities.

BOB KRAFT
IAU President, 1997-2000

Greetings from the New General Secretary

What attracts a person to the job of IAU General Secretary? For my own part, the special quality of the IAU which I might call "constructive disobedience." Maybe because astronomy is often considered an entirely harmless enterprise, we have the occasional opportunity to help undermine the walls that still separate some of our communities. For example, I enjoyed hearing how astronomers from both parts of China were happily discussing their joint research at the Asian-Pacific Regional Meeting in Korea last year, and the success of the International School for Young Astronomers which Don Wentzel and his team have just held in Iran (see the *Sidereal Times* last week) is another small, but significant step in the right direction. Walls are torn down the same way they are built, stone by stone.

The IAU is a bit like a ship. On the bridge, the Executive Committee sets out the course, and below deck the Chief Engineer (the General Secretary) and the staff battle with the machinery to make the ship actually move in that direction. The ship may appear to move slowly, and to some of you the IAU does seem to move maddeningly slowly on your favorite issues. Yet, despite our very limited fuel supply (money!), a lot is, in fact, going on. In The Hague, the new format of the GA was introduced, and while some fine tuning may remain, the large number of participants which the combined GA and Symposia have enabled us to attract - and support - is solid proof of its success. Similarly, the new Division structure has been adopted after the trial period, and I look forward to working with the Division Presidents to turn it into a real "turbo charger" for the IAU machinery. And finally, the IAU is quickly beginning to assume a useful role as a forum for early discussions of future, large-scale facilities.

You will be able to judge for yourself in another three years, and I look forward to working with our British friends to make the XXIVth General Assembly another memorable event. Our Japanese hosts at this GA have set awesome standards for us to meet, but we shall take their example as our best inspiration.

JOHANNES ANDERSEN
IAU General Secretary, 1997-2000

Behind the Scenes...

Most readers of the *Sidereal Times* are familiar with the editors of this journal. Our names appear daily under the masthead, and we even dared to print our photos in the first issue.

However, there are two additional people involved in the production of this newspaper whom we should like to bring to your attention. Mr. Hirotsugu Wakano, a student at Kyoto University, has been a tireless general assistant for the *Sidereal Times*, and has had the verve and physical dexterity to pose in photos depicting bowing and eating off the subway floor.

Mr. Kazuhiro Matsuyama, an employee of the Kyoto Kikanshi Printing Company, has expertly laid out every issue of this journal. Layout consists of placing text, photos, and other materials together in a way that is attractive and that leaves no embarassing "holes." Mr. Matsuyama did this every day, with the greatest equanimity and skill. It is a task akin to solving a difficult jigsaw puzzle under the pressure of a very hard deadline, all the while being badgered by editors trying to fit in "just one more article." Mr. Matsuyama's artistic skills can also be seen in the illustrations and photo montages that have occasionally graced these pages.

We are more than grateful to these people. We are sincerely in their debt.

THE EDITORS

Kazuhiro Matsuyama takes a rare break.

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President/Vice-President
28 Galaxies, Bertola F./Okamura S.
47 Cosmology, Szalay A./Peacock A.
IX OPTICAL TECHNIQUES, Sterken Ch.
President/Vice-President
9 Instruments, McLean J./Su Ding-qiang
25 Stellar photometry & polarimetry, Sterken Ch.L./Landolt A.
30 Radial velocities, Hearnshaw J.B./Tokovinin A.
X RADIO ASTRONOMY, Moran J. M.
President/Vice-President
40 Radio astronomy, Moran J.M./Padrielli L.
XI SPACE AND HIGH ENERGY ASTROPHYSICS,Wamsteker W.
President/Vice-President
44 Space & high energy astrophysics, Srinivasan G./Okuda H.

The Kyoto Declaration

Radio astronomy observations have, for many years, been troubled by the effects of interference. Early problems were motor car ignition systems which disturbed low frequency observations, or electric fences whose pulsed signals sometimes confused pulsar observers. Although annoying at the time, these sources of interference were recognizable and could often be supressed - they now seem trivial compared to today's problems. Today, TV companies in Italy blatantly transmit in the protected band at 1420 MHz, and a radio link passing through Jodrell Bank interferes with observations at 1666 MHz. But even these somewhat localized problems seem minor compared to the threat posed by tomorrow's ubiquitous satellite transmissions. There will be no escape - no radio observatory, no matter how remote, will be immune.

The radio spectrum is shared among users under the auspices of the International Telecommunications Union, ITU. The ITU cuts the spectrum into slices, like a cake, but by their very nature, radio transmissions cannot be cut to zero at band edges. This would not be a problem to passive users of the spectrum, like radio astronomers, if transmitter frequencies were kept well away from our bands, but the proliferation of active users is putting such pressure on the available spectrum that we are finding, for example, satellite transmissions in bands adjacent to the radio astronomy bands. Radio astronomy systems are so sensitive that they are easily saturated by these transmissions and rendered useless.

Such is the global nature of the threat posed by low-earth orbit satellites used for mobile telephones, for example, that the directors of many of the world's radio astronomy observatories met here last Friday to discuss the problem and determine what action to take. They realise that they must be diligent and that they must coordinate their efforts, but that the onus lies with them to tackle the problem not just through their administrations, but by a process of education of the public and of the communications community. Furthermore, they realise that they must double their technical efforts to build low-loss filters and other systems to mitigate the effects of interference. As a measure of their resolve, they have agreed to sign the 'KYOTO DECLARATION.'

THE KYOTO DECLARATION

As directors of the world's radio and other observatories, we note the increasing use of the radio spectrum by commercial interests. While recognizing the economic importance of such use, we are concerned that it should not harm radio astronomy, a uniquely powerful means for the study of the universe. To protect the benefits to humankind of radio astronomy, we resolve to undertake the following initiatives. We will conduct a program of activities to educate our fellow scientists, the telecommunications industry, and the general public to the necessity of protecting radio astronomy's spectrum requirements. Further, we will study technical means to mitigate the problem of interference.

We endorse the formation of the Radio Astronomy Working Group of the Megascience Forum and will support it in its efforts to inform science policy makers of radio astronomy's concerns in the area of spectrum management. Finally, we will all intensify participation in the regulatory processes conducted by the International Telecommunications Union and its member nations' agencies by increasing the number of personnel and resources devoted to spectrum management.

In order to make our input more effective we agree to increase the level of coordination between the world's radio observatories so that we can present a common position on issues of radio spectrum management. In North America and Europe, coordinating groups already exist (CORF, CRAF) and we endorse the proposal to generate similar coordinating groups in the Asia-Pacific region and in South America.

ROY BOOTH
Uppsala, Sweden

I.D. Novikov sucks the audience into a scintillating discussion of black holes.

Manchester invites you to the XXIVth General Assembly, 7-19 August 2000

Manchester, on behalf of the United Kingdom astronomical community, is honored to host the Millennium IAU General Assembly.

We are a modern city with ancient foundations whose origins go back to the Roman town of Mancunium. During the industrial revolution, Manchester was "king of cotton," taking benefit from its moist climate. Let me assure you that global warming has made the city an attractive one to visit, set on three sides by hills you can see on any day from the regenerated city center. Amongst its claims to fame, the city has the world-renowned Halle Orchestra, the Manchester United Football Club and Old Trafford, the site of many famous encounters between the cricketing nations. Manchester has a major educational complex accomodating some 50,000 students.

The campus of the University of Manchester will house the General Assembly. The University was founded in 1851, and has had many famous students and staff. Those who did much of their significant work in Manchester include the Nobel Prize winners Ernest Rutherford, Lawrence Bragg and Patrick Blackett. More recently Bernard Lovell established the well-known Jodrell Bank Radio Astronomy Observatory here.

When you come to Manchester you can not only visit its many cultural and historical sites, but you will be located in the very center of England with other tourist attractions in easy reach. We look forward to seeing you in Manchester.

R. D. DAVIES
Co-Chairperson LOC, IAU XXIV GA, 2000

Accent on Acronyms

DID YOU KNOW that the world's most cumbersome acronym, for a compound used in artificial sweeteners, is over twenty-thousand characters in length?

AUTOMATIC ASSESSMENT OF ACRONYMS

Concerning designations prior to publication: Would it not help if there was an automatic trap for non-conforming designations when one submitted an article for publication or survey data to an electronic data archive?

The TG on Designations is working on this in collaboration with Directors of Data Centers and Editors of (Electronic) Journals.

H.R. DICKEL
Chair, IAU Task Group on Designations

Restroom Ambience

Many GA attendees have been startled by the soothing sound effects played in KICH's restrooms, namely birds and running water. Research by the Kyoto Foundation for Acoustic Psychology has shown these sounds have a highly salubrious effect on restroom visitors. The effects are so expertly done that one attendee spent two hours trying down to hunt down the feathered noisemakers, believing they were trapped in the plumbing.

In fact, the sounds are generated in a small room in the KICH basement, and electronically piped to the building's public conveniences. A project by NEC to synthesize bird phonemes will soon put these cheeky beakers out of business.

Lavatory sound effects.

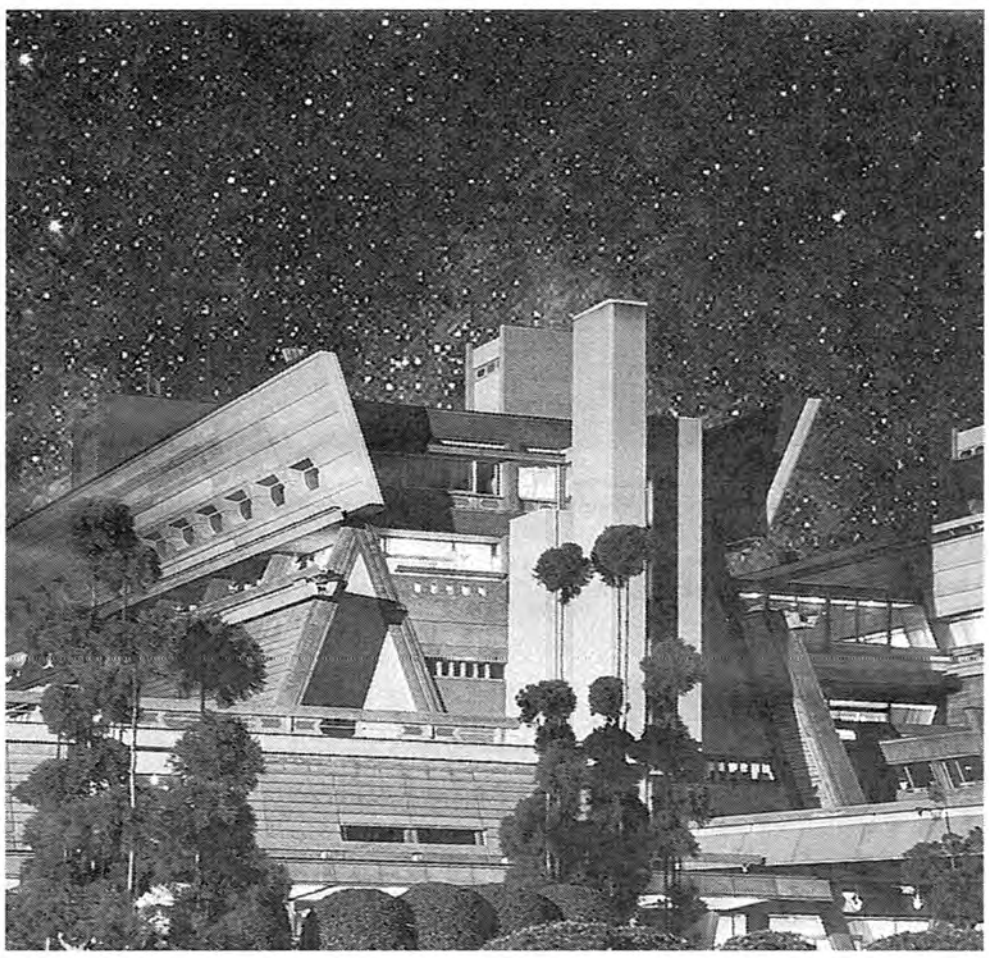
The Sidereal Times

IAU XXIIIrd General Assembly - Kyoto 1997

Kyoto IAU 23

Editors: *JUN JUGAKU, SETH SHOSTAK, MASAHIDE TAKADA-HIDAI*

No.11: Friday, 29 August



Goodbye to Kyoto!

Kyoto and the 23rd General Assembly were memorable, and most of us will leave this lovely city with regret.

But this Assembly is just the latest pearl on a lengthening string. Founded in 1919, the International Astronomical Union held its first General Assembly in May, 1922. The locale was Rome, and the IAU General Secretary was Prof. A. Fowler of London's Imperial College. The President was M.B. Baillaud of Paris. Budgets then, as now, were tight: expenditures in 1921 amounted to 981 pounds sterling.

The 23rd General Assembly in Kyoto attracted two thousand of the IAU's nearly 8,000 members. There were 6 Symposia, 11 Divisions, 42 Commissions and Working Groups, and two weeks of stimulating discussion. The growth of the General Assembly is impressive, but its purpose remains what it was three-quarters of a century ago: to facilitate the relations between astronomers of different countries, and to promote the study of astronomy in all its departments.

Members can be proud to be in such an organization. And they will remember Kyoto as one of the bright stars in a stunning constellation.

Cosmological Chemical Evolution

Understanding the chemical evolution of galaxies is one of the key issues in cosmology. The traditional way in which galactic chemical evolution is investigated is to study HII regions and stellar populations in nearby galaxies, including our own Milky Way.

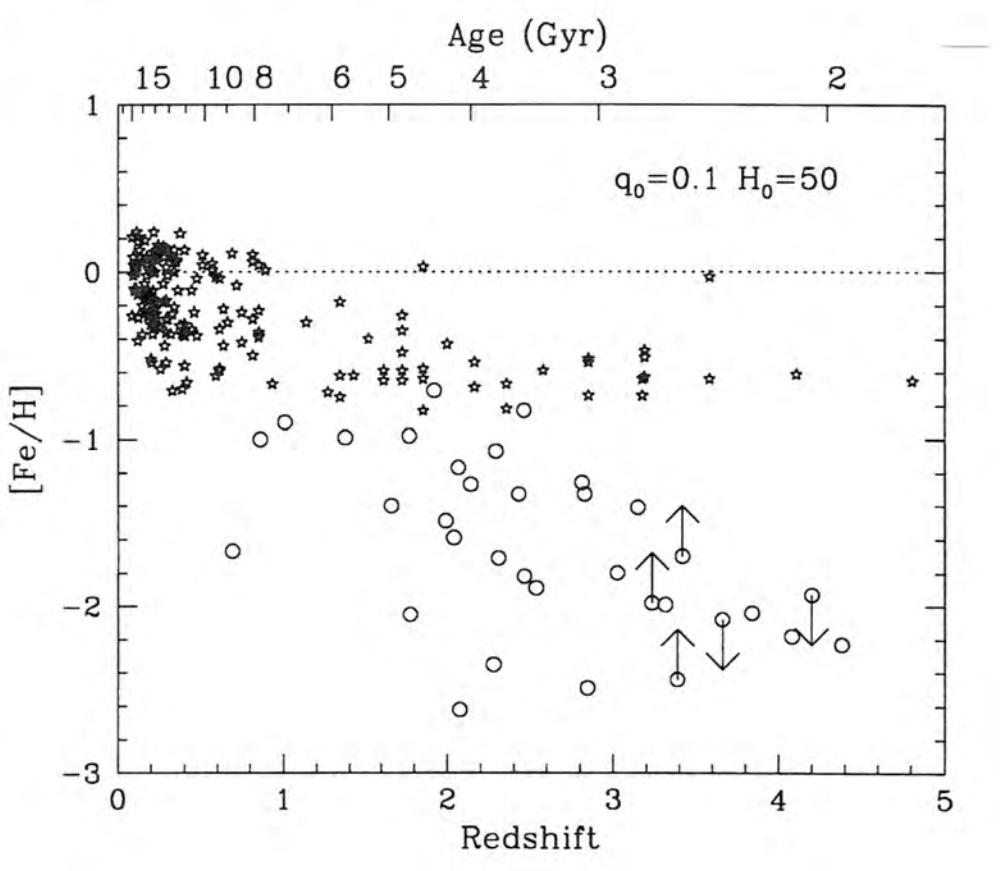
Limin Lu

Studies of damped Lyman alpha absorption-line systems in quasar spectra, believed to be caused by the high-redshift counterparts of today's galaxies, have opened up a new window for probing directly the chemical enrichment history of galaxies since a very early epoch (z~4) when the universe was only ~10% of its present age.

We have used the 10 m Keck Telescope to obtain abundance measurements for about thirty such systems. Combining these results with existing data produces the attached figure. It shows the Fe abundance as a function of red-shift (z), with the corresponding age of the universe given on the top axis for a cosmology having a q_o of 0.1 and H_o of 50 km/s/Mpc. Data for galactic disk stars in the solar neighborhood are indicated by stars in the figure. These data are from Edvardsson *et al.* The circles show results for Lyman alpha systems. An increase in metallicity of approximately two orders of magnitude since z~4 is clearly visible.

Through this kind of work, we can hope to garner unique information about the history of chemical enrichment in high-z galaxies.

LIMIN LU
Calif. Institute of Technology



Targets for SETI

Which stars should Project Phoenix (see *Sidereal Times* #10) target with its sensitive radio receivers, as it searches for signs of technical civilizations on planets orbiting other suns?

A natural reaction to this question is to rely on what we know about the way intelligent life evolved on a planet orbiting our own Sun, and to select G dwarfs, ones which are old enough to have allowed evolution to unfold as far as radio transmitters. Thus, the majority of the targets for Project Phoenix are drawn from a list of more than 3,000 nearby G dwarfs, selected to be within 60 parsecs on the basis of Olsen's four-color photometry. A team led by David Soderblom at the Space Telescope Science Institute has worked to identify those targets less than 1 or 2 billion years old using indicators of youth such as chromospheric activity, so that they could be given lower priority. Meanwhile, teams at CFA and the Geneva Observatory have monitored the radial velocities of all the stars in the sample in order to identify those systems that have stellar companions which would interfere with the formation or survival of planets orbiting in the habitable zone. In addition to their contribution to the selection of SETI targets, these observations can also be used for astrophysical studies of the orbital characteristics of the companions to solar-type stars. The SETI targets should also be prime candidates for more sensitive searches for planetary companions.

Dave Lathman

But we must be careful not to allow our prejudices about the evolution of intelligent life to dictate too strongly the selection of SETI targets. For this reason, Project Phoenix is also concentrating on the 100 nearest systems, regardless of the spectral type, age, or companionship. Because these systems are the nearest, they also offer the opportunity for the best sensitivity. So, if there is a signal beamed at us from Vega, as envisioned by Carl Sagan in *Contact,* we won't miss it for lack of trying.

DAVID W. LATHAM
Harvard-Smithsonian Center
for Astrophysics

Alien home?

The Fate of Astronomy in the Former Soviet Union

The Soviet Union was active in pursuing science, including astronomy. About 2% of the Gross Domestic Product (GDP) was allocated for research and development. Astronomy projects included optical, radio, Cerenkov gamma, and neutrino observing facilities, both ground- and space-based. A good system of astronomy education was in place.

But after the USSR was dissolved, the GDP decreased 2.5 times, and only 0.5% of it is going to research. The budget for science has decreased by a factor of 10. The prestige of science has also decreased, as has the influx of young people into science. Everwhere in the former Soviet countries, the salaries of scientists are lower than average, and are quite near subsistance level. Political problems at the country-to-country level make use of telescopes difficult.

Nevertheless, astronomical research is pursued, and many new results have been presented by astronomers from these countries at the GA. The main body of scientific personnel and practically all of the instrumentation are still intact. The space program has continued. The 6 m telescope is equipped with modern CCD cameras, and both 2- and 3-dimensional spectrographs. Several new radio and optical telescopes are coming on line. The most stable situation obtains for the Baltic countries, for Russia and the Ukraine. The 2.6 m telescope of the Byurakan Observatory in Armenia has been equipped with modern CCD cameras, the 2 m telescope of the Shemakha Observatory in Azerbajan does not work. In Central Asia, the most developed astronomy program is in Uzbekistan. A more difficult situation obtains in Tajikistan as a result of civil war.

In all of the former Soviet countries, major difficulties are faced by libraries. International subscriptions are very important. Internet access is easy in the Baltic countries and the European part of Russia. Limited Internet usage applies to astronomers in the Ukraine, Armenia, and Georgia. So it is too soon for electronic-only publication in these countries.

NIKOLAI BOCHKAREV
(boch@astronomy.msk.su)
Euro-Asian Astron. Society

True Facts!

During the period when shoguns called the shots, names were illegal in Japan. This inconvenient situation changed with the Meiji Restoration in 1868, when everyone suddenly had to have a moniker. Until recently, all girls' names ended in 'ko', as in Yoko Ono.

High-Energy Astrophysics Data and You

If you often find yourself sitting in your office wondering, well (HST, VLA, ISO. KECK... fill in the name of a low energy observatory here) has some great data, but what about all the obscuring dust that's in the way? How can I see into that hot core? If so, then maybe you need some higher energy data to cut through all that mess. If that's the case, then the High-Energy Astrophysics Science Archive Research Center (HEASARC) based at NASA's Goddard Space Flight Center is for you.

"But I'm not an X-ray astronomer!" you might complain. "Even if I could access data from ROSAT, ASCA, XTE or CGRO, I wouldn't know what do to with it." An answer to your concerns is as easy as WWW.

W) On the HEASARC home page (http://heasarc.gsfc.nasa.gov/) you can find all the tools and software you need to begin your career as a high-energy astrophysicist, as well as access to the complete public archive.

For example, if you are interested in a random star like AR Lac, which has been a wee bit active and has been observed at many wavelengths, you could search the entire HEASARC database via the web with W3Browse (http://heasarc.gsfc.nasa.gov/W3Browse). There is a basic and an advanced interface to aid in your searches.

Or you could conduct the same search with ARGUS, (http://heasarc.gsfc.nasa.gov/ARGUS/) which searches the mission timelines as well to determine if the object will be observed in the near future. Via W3Browse, you can then select the datasets you are most interested in, and download the actual data products in a tar file.

"Ok," you say, "now I have data, but what do I do with it."

W) Online, on the individual mission pages (*i.e.* http://asca.gsfc.nasa.gov/; http:// rosat.gsfc.nasa.gov, http://xte.gsfc.nasa.gov ...) you can find guides to basic data analysis using FTOOLS, XSELECT, and the XANADU package of software (XSPEC, XRONOS, XIMAGE) (notice the naming trend here). These are multi-mission, multiplatform tools (SunOS, Solaris, OSF, LINUX ...) that work with standard FITS files.

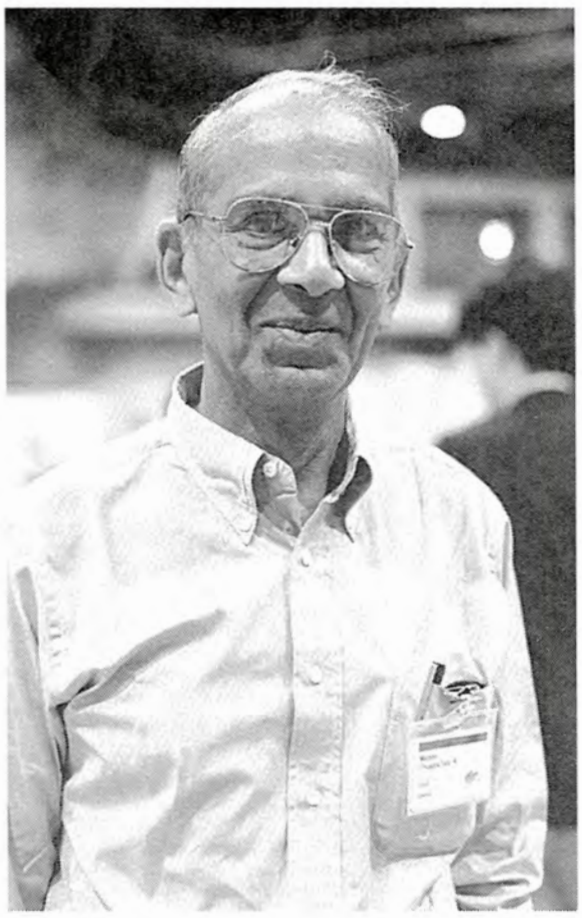
W) Finally if you go to the software link of the HEASARC home page (http://heasarc.gsfc.nasa.gov/HHP_sw.html) you can download tar files of all the software, along with instructions for you (or your friendly neighborhood system administrator) to install on your laptop, workstation, or network.

Finally don't forget about our education outreach pages http://StarChild.gsfc.nasa.gov; for younger children (~4 - 14 yrs.) and http://imagine.gsfc.nasa.gov/ for high school and some undergraduate material.

If you have questions, you can contact us at feedback@athena.gsfc.nasa.gov.

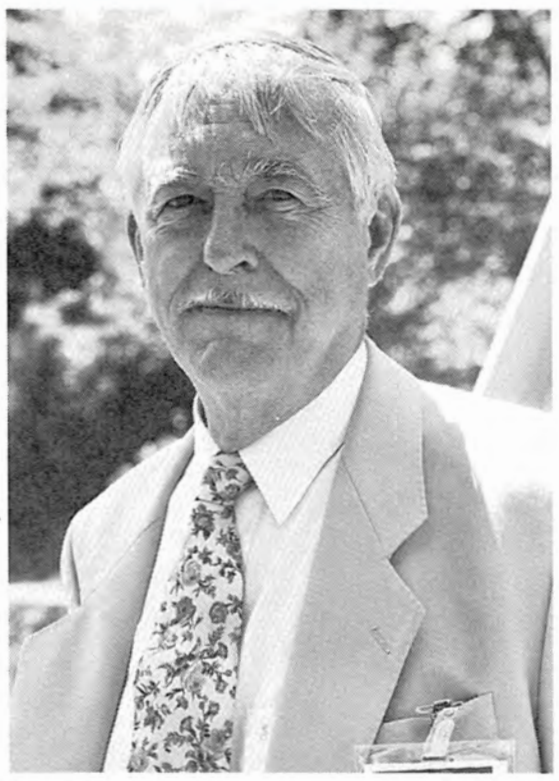
MICHAEL ARIDA
NASA Goddard Space Flight Center

Sidereal Times

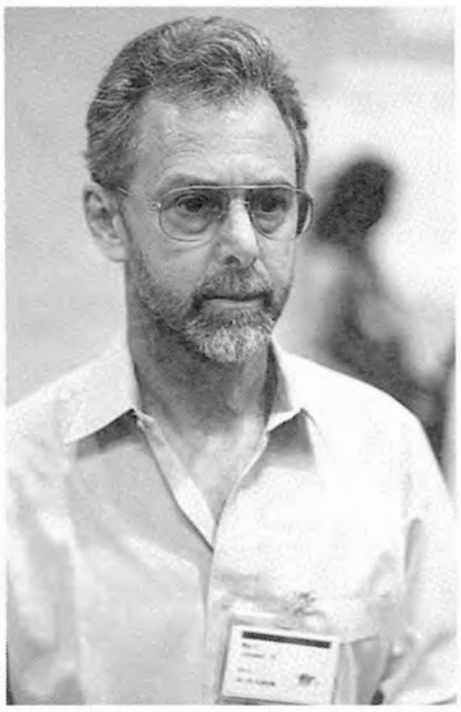


T.K. Menon

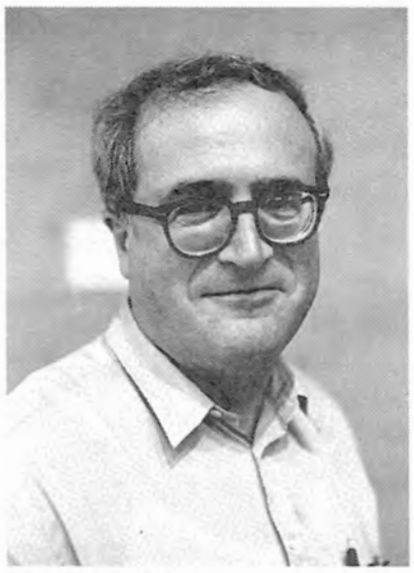
Donat Wentzel



Chip Arp



Jasper Wall

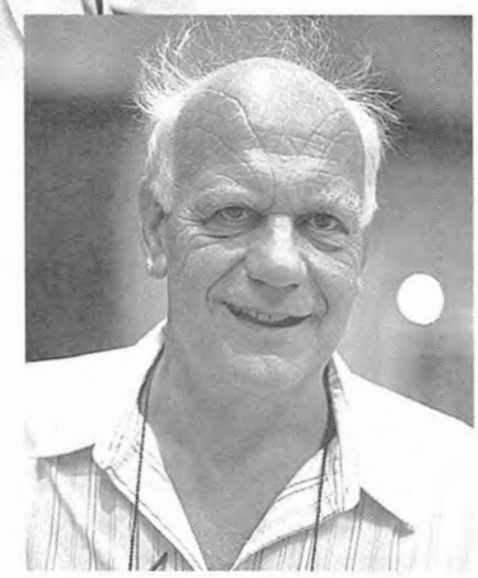


Renzo Sancisi

Cathy Woods

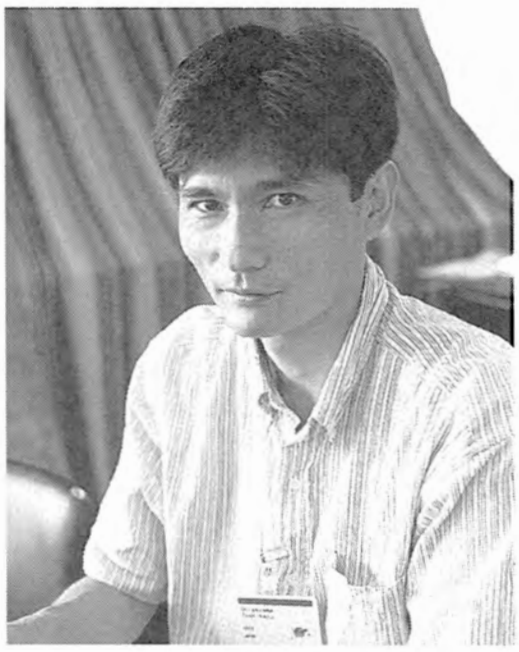
Maria Rose Hunt

Eli Brinks



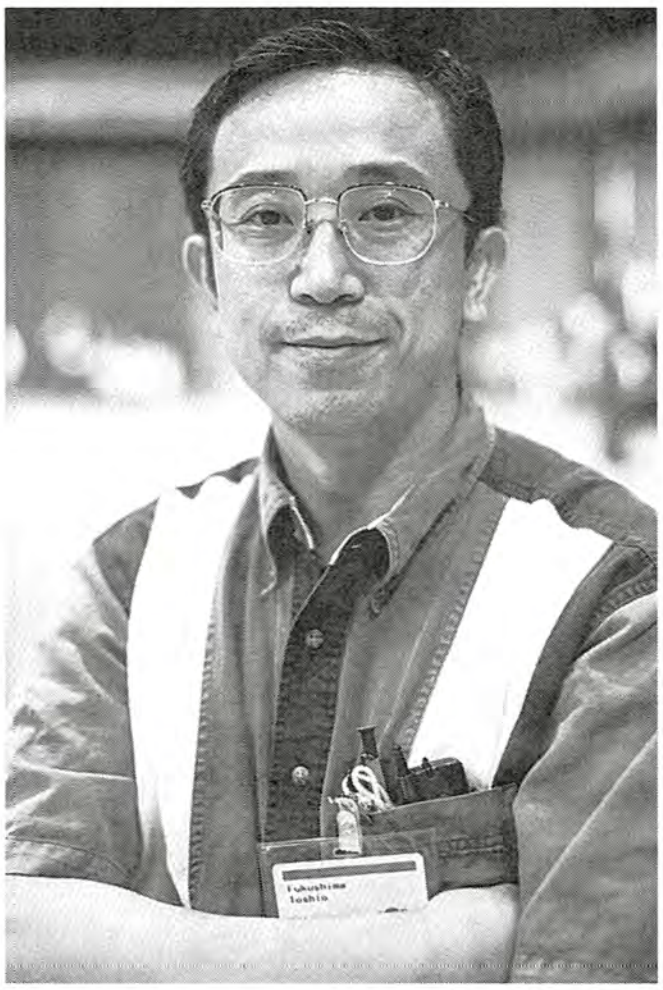
Franco Pacini

Toshikazu Shigeyama

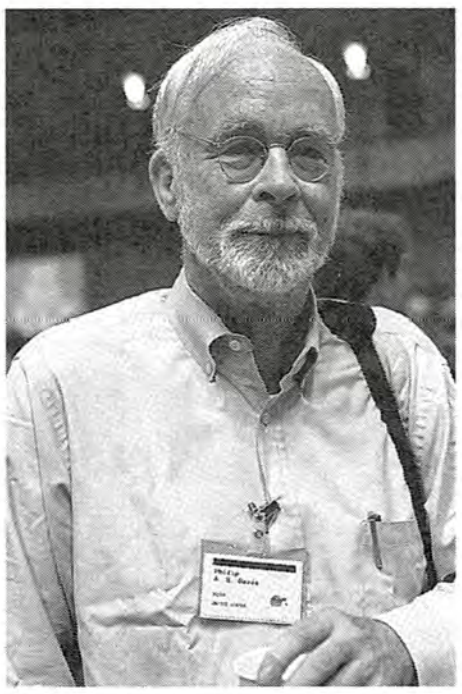


Maddaleve Spada

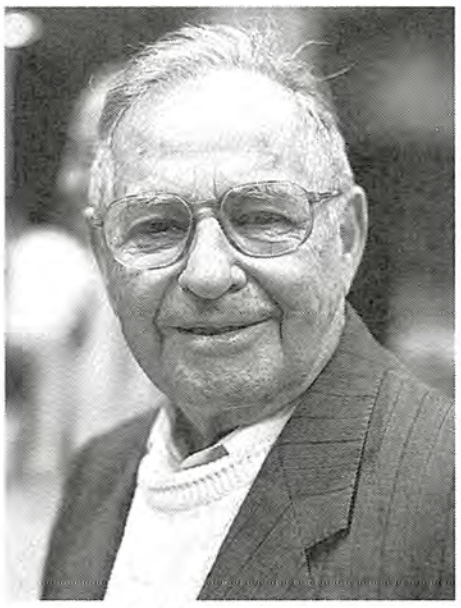
M. Parthasarathy



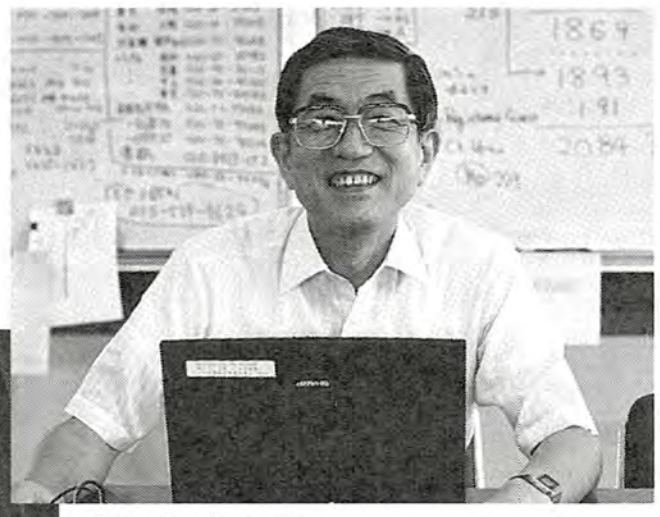
Toshio Fukushima



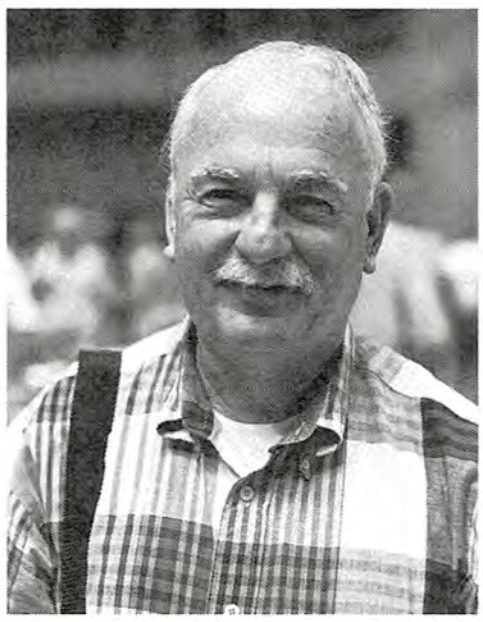
Davis Philip



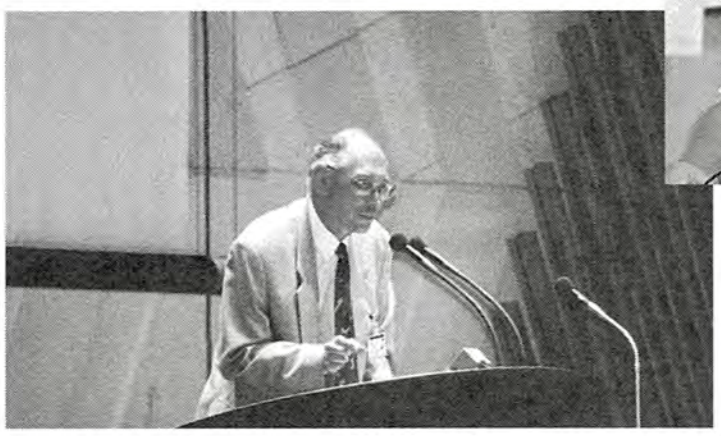
Jean-Claude Pecker



Daiichiro Sugimoto

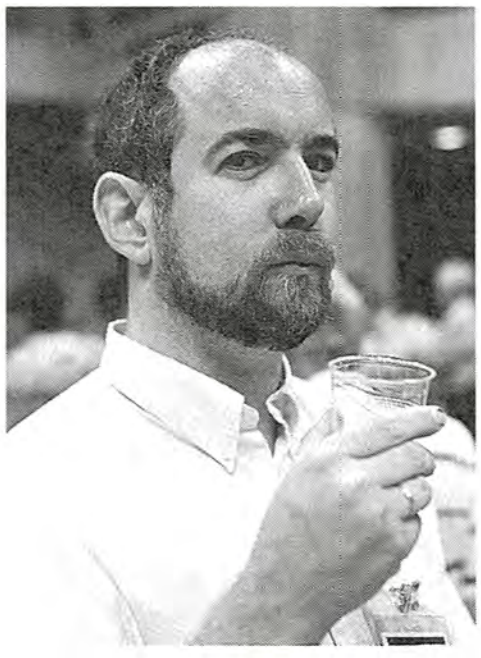


Sam Gulkis



Immo Appenzeller

Heather Couper, Nigel Hengbest, and their latest literary offering

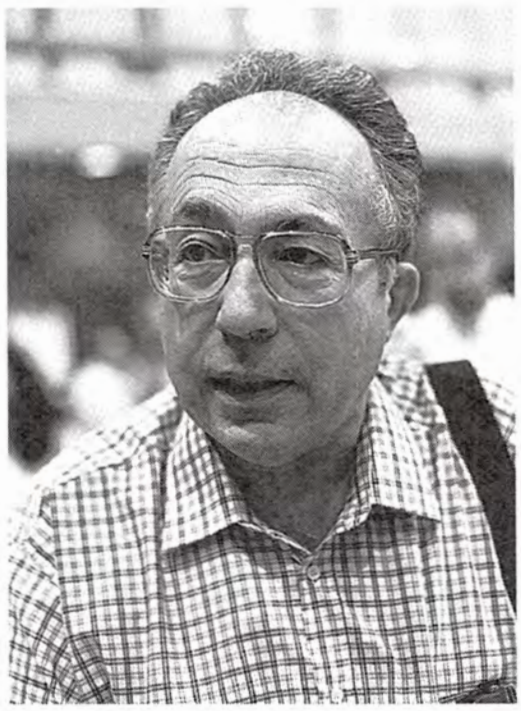


Wim van Driel

Harvey Liszt

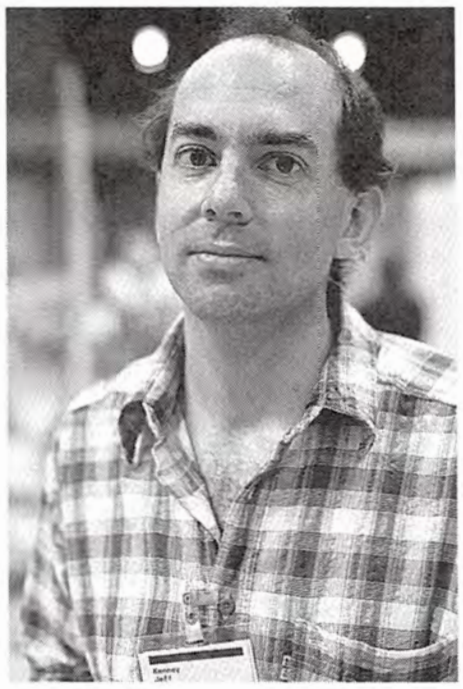
Sidereal Times

Jaqueline van Gorkom



Francesco Bertola

Peter Goldreich and Mrs. Goldreich



Jeff Kenney

Deer's rear

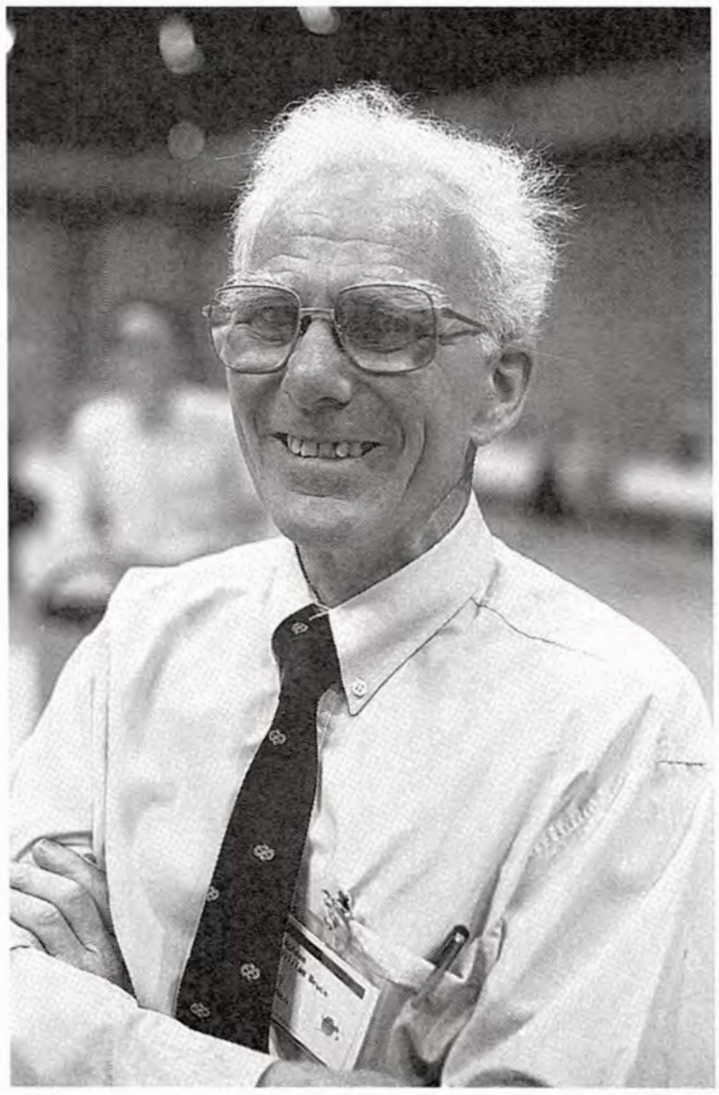
Ed Fomalont

Andrea Dupree

Bruce Mcfadden

Arnold Benz

Jeremy Mould



Maho Kuroiwa

Banquet Bash

One guest was reminded of the Crimean War. Another thought of locusts.

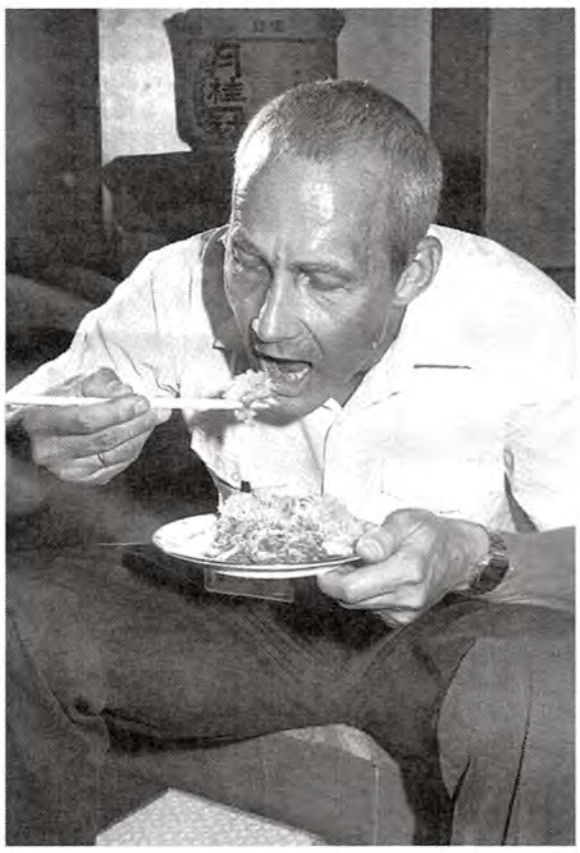
More than a thousand General Assembly attendees were milling about the Mizuho of Miyako Hotel's large ballroom, when waitresses brought in the first of the food. The ensuing scene resembled a bloodied tuna being tossed into shark-infested waters. For reasons that will remain among the five great mysteries of the twentieth century, GA participants swarmed the serving tables as if they were confronting the last casseroles on Earth. The organizers quickly brought in several dozen *oshiya*, white-gloved pushers normally employed in packing subway cars during rush hour. They did their best to deflect attendees from the tables, but the few had little success against the many.

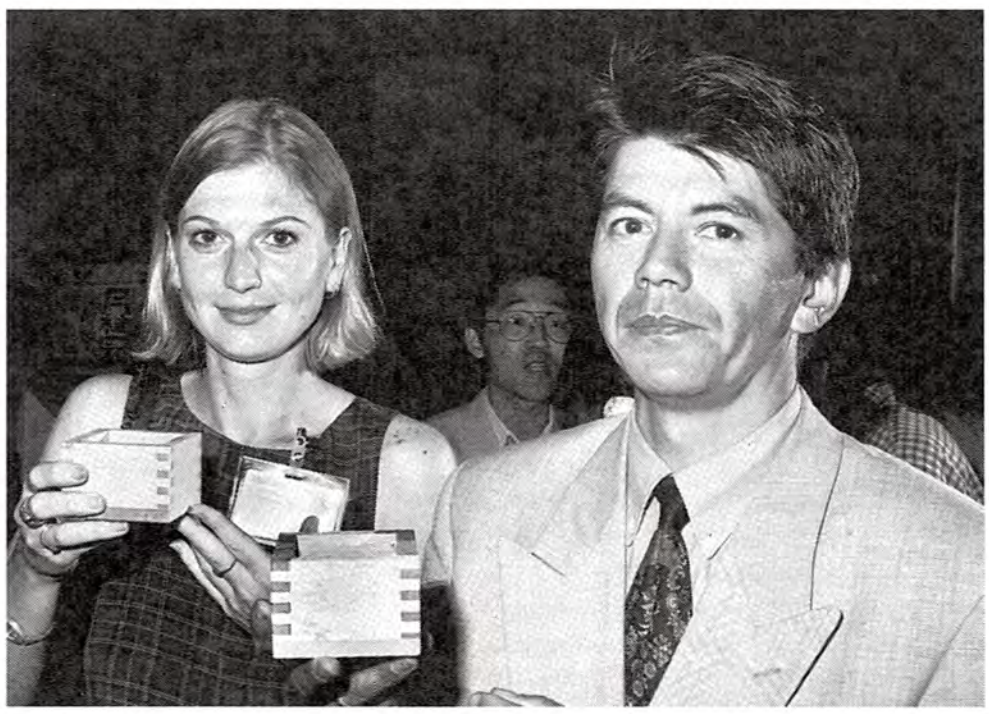
"I don't know how to explain it," said one attendee, "maybe it's the result of spending a week eating boiled cephalopod parts served in partitioned boxes."

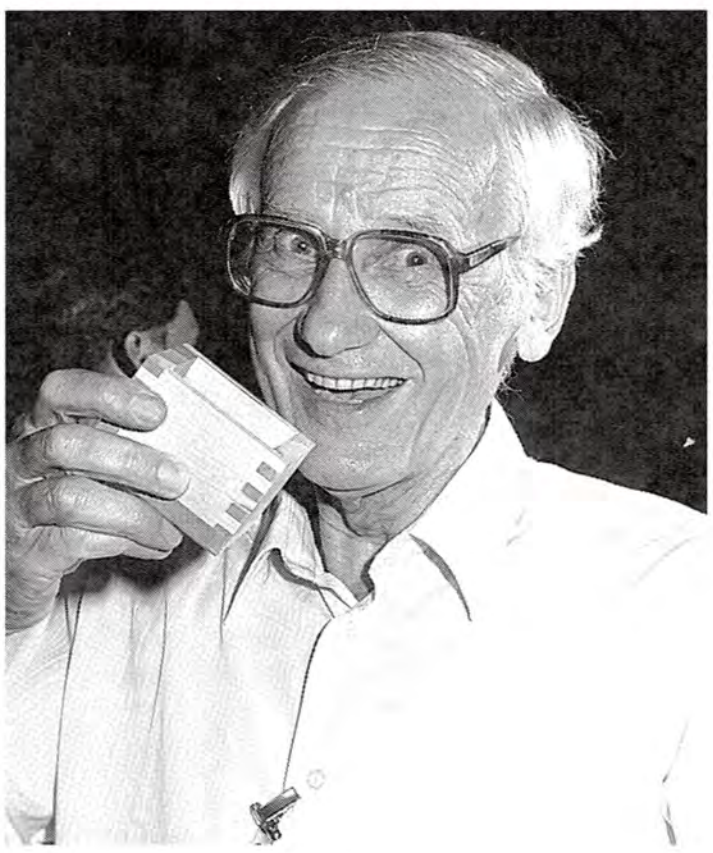
The rush to consume the very first offerings was unnecessary, as the organizers had ordered sufficient food to feed the Swiss Army. Indeed, once the initial stampede had subsided, the attitude of the guests mellowed considerably, and the following two hours were spent engaging in small talk, listening to Japanese songs, and watching Lion Dancing.

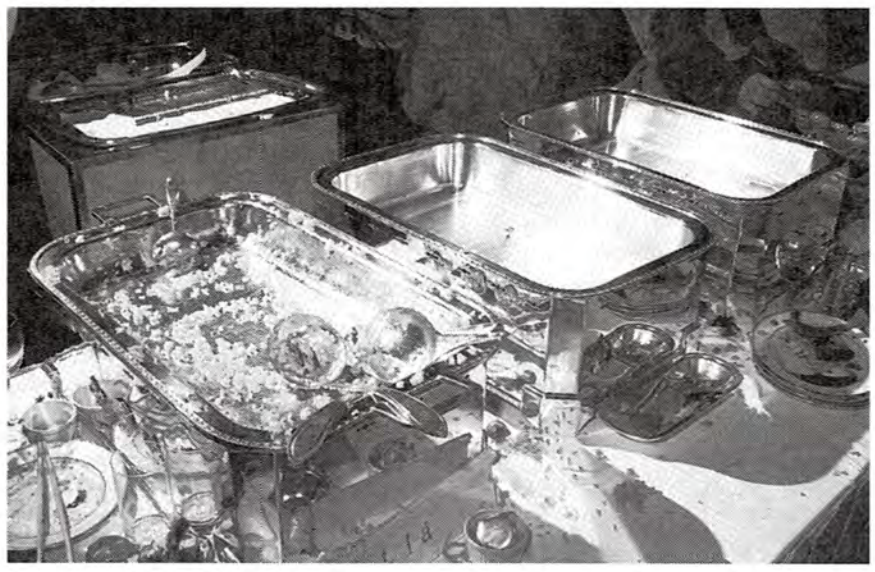
By 10:00 pm, the hordes were washing over the downtown areas, seeking out bars where they could dance away the accumulated calories. It was a night to remember.

Sidereal Times









The Program of IAU Sponsored Meetings in 1998

On August 28 the IAU Executive Committee decided on the IAU meeting program for 1998. A large number of proposals had been submitted, and unfortunately it was not possible to support them all within the limitations of the budget. The meetings finally selected were the following:

Symposium 190: New Views of the Magellanic Clouds, Victoria, Canada, July 13-19

Symposium 191: Asymptotic Giant Branch Stars, Montpellier, France, August 28- September 1

Symposium 192: The Stellar Content of Local Group Galaxies, Cape Town, South Africa, September 7-12

Symposium 193: Wolf-Rayet Phenomena in Massive Stars and Starburst Galaxies,
West Coast, Mexico, November 3-7

Symposium 194: Activity in Galaxies and Related Phenomena, Byurakan, Armenia, August 17-21

Hans Rickman

Colloquium 168: Cometary Nuclei in Space and Time, Nanjing, China, May 18-22

Colloquium 169: Variable and Non-Spherical Stellar Winds in Luminous Hot Stars, Heidelberg, Germany, June 15-19

Colloquium 170: Precise Stellar Radial Velocities, Victoria, Canada, June 21-26

Colloquium 171: The Low Surface Brightness Universe, Cardiff, U.K., July 6-10

Colloquium 172: The Impact of Modern Dynamics in Astronomy, Namur, Belgium, July 6-11

Colloquium 173: Evolution and Source Regions of Asteroids and Comets, Tatranska Lomnica, Slovak Republic, August 24-28

IX Latin American Regional Astronomy Meeting, Tonantzintla, Mexico, November 9-13.

Co-Sponsorship of 32nd COSPAR Scientific Assembly, Nagoya, Japan, July 12-19.

Note that in the cases of Symposium 194 and Colloquium 173, acceptance is provisional only, final approval being contingent on approval of a revised scientific program by the EC.

HANS RICKMAN
Assistant General Secretary and Uppsala Observatory

List of Deceased Members

Prof. Arthur F. Adel	USA	Dr. Fossi Bruna Monsignori	Italy
Prof. Hannes Alfven	Sweden	Dr. Bruno L. Morando	France
Dr. David A. Allen	Australia	Prof. Michael Moutsoulas	Greece
Prof. V. A. Ambartsumian	Armenia	Dr. Antonin Mrkos	Czech Republic
Dr. Paul Baize	France	Prof. Edith A Mueller	Switzerland
Dr. Nicole J. Bel	France	Prof. V Nadolschi	Rumania
Francoise Boigey	France	Prof. Andrej A Nemiro	Russia
Dr. Renee Canavaggia	France	Prof. Edward P Ney	USA
Dr. Jason A. Cardelli	USA	Dr. Maya Ogir	Ukraine
Dr. Marco Catarzi	Italy	Prof. Bernard M Oliver	USA
Prof. S. Chandrasekhar	USA	Dr. Bedrich Onderlicka	Czech Republic
Prof. Ganesar Chanmugam	USA	Dr. Thornton L. Page	USA
Dr. P. F. Chugajnov	Ukraine	Prof. N. N. Parijskij	Russia
Dr. K. K. Chuvaev	Ukraine	Prof. Georgij I. Petrov	Russia
Dr. Jules J. de Kort	Netherlands	Prof. K. Pilowski	Germany
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