Sixth Middle-East & Africa Regional IAU Meeting
(MEARIM-2023)
(TALK of the Loc. Chairman)

Dear honored guests, participants at the Sixth Middle-East & Africa Regional IAU Meeting,
Ladies and gentlemen;

We welcome you today at the National Research Institute of Astronomy and Geophysics.

Let me introduce myself,
I am Makram Ibrahim, the Head of the Solar and Space Research Department at the National Research Institute of Astronomy and Geophysics (NRIAG), and the Chairman of the conference's Local Organizing Committee.

NRIAG is hosting the 6th Middle-East and Africa Regional IAU Meeting. This assembly is the second time to be held in Egypt. The 1st one was held in Cairo, in April 2008.

The meeting aims to bring together astronomers, observational, and theoretical astrophysicists, and space scientists to encourage interaction and collaboration between them and to associate with as many African and Middle Eastern countries as possible.

The Conference Covers a wide range of topics in the field of astronomy and space science to explore the near and far universe.

The Program is divided into 10 oral sessions and 4 poster sessions including:

- Education and Outreach Astronomy
- Galaxies and Extra-galaxies
- Solar Physics and Space Weather

- Stellar Astronomy
- Modern observation
- Dynamical Astronomy
- Solar System and solar-terrestrial physics
- Cosmology and High Energy Astrophysics
- Instrumentation and site testing

The conference activities will last for four days. During the conference, 90 research papers will be presented; 63 for oral presentation and 27 for poster presentation.

Also, we are honored to have 10 keynote speakers who are considered the leaders in the field of Astronomy and space science.

On the last day of the Conference, and after the closing session, we have an Excursion Tour, to **The Pyramids & The National Museum of Egyptian Civilization.**

- In addition to an oriental dinner

(For participation and registration to the Excursion Tour,
Please record your name at the entrance of the Lobby)

Ladies and Gentlemen, I wish you a very good and fruitful meeting.

Once again,
Welcome to Egypt and Thank you


IAU
National Research Institute of Astronomy and Geophysics (NRIAG)
Middle East and Africa Rigional IAU Meeting MEARIM VI
IAU
National Research Institute of Astronomy and Geophysics (NRIAG)
Middle East and Africa Rigional IAU Meeting

المعهد القومي للبحوث الفلكية والجيوفيزيقية NRIAG
قاعة المؤتمرات الرئيسية

National Research Institute
of Astronomy and Geophysics
(NRIAG)

IAU Regional Meetings
MEARIM 2023
Sixth Middle-East and Africa Regional IAU Meeting

MEARIM VI

PROGRAM AND BOOK OF ABSTRACTS

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Organizing Committee

Prof. GAD EL-QADY
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Prof. Ashraf Shaker
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IAU Regional Meetings
MEARIM 2023: Sixth Middle-East and Africa Regional IAU Meeting

February 13-16, 2023

General Programme

	Monday 13 -2- 2023	
09:00 - 10:00	**Registration**	
10:00 - 11:30	**Opening (Main Hall)**	
11:30 - 12:00	**Break**	
12:00 - 12:30	**General Lec.: Roger Blandford Cosmic Power: How Astronomers get to Observe so much of the Universe (Main Hall)**	
12:30 - 02:15	**Oral Session 1 - Education and Outreach Astronomy (Main Hall)**	
02:15 - 03:15	**Lunch**	
03:20 - 05:20	**Poster Session (Main Hall+ VIP Room)**	
	Tuesday 14 -2- 2023	
09:00 - 09:30	**Registration**	
09:30 - 11:30	**Oral Session 2 - Galaxies and Extra-galaxies (1) (Main Hall)**	
11:30 - 12:00	**Break**	
12:00 - 02:00	**Oral Session 3 - Solar Physics and Space Weather (Medwar Hall)**	**Oral Session 4 - Galaxies and Extra-galaxies (2) (Kobeasy Hall)**
02:00 - 03:00	**Lunch**	
03:00 - 05:20	**Oral Session 5 -----Stellar Astronomy (Main Hall)**	
	Wednesday 15 -2- 2023	
09:00 - 09:30	**Registration**	
09:30 - 10:00	**General Lec: Liu Jing The observations of the space debris and the near earth object) (Main Hall)**	
10:00 - 11:30	**Oral Session 6 - Modern observation (Medwar Hall)**	**Oral Session 7 - Dynamical Astronomy (Kobeasy Hall)**
11:30 - 12:00	**Break**	
12:00 - 02:00	**Oral Session 8 - Solar System and solar terrestrial physics (Medwar Hall)**	**Oral Session 9 - Cosmology and High Energy Astrophysics (Kobeasy Hall)**
02:00 - 03:00	**Lunch**	
03:00 - 05:15	**Oral Session 10 - Instrumentation and site testing (Main Hall)**	
	Thursday 16 -2- 2023	
09:00 - 09:30	**General Lec: Zinovy Malkin (International Celestial Reference Frame (ICRF): Connecting Astrometry and Astrophysics) (Main Hall)**	
09:30 - 10:00	**Closing (Main Hall)**	
10:30	**Excursion**	

Main Conference Hall
1st Day, 13.02.2023
Time: 12:00-12:30

Cosmic Power: How Astronomers get to Observe so much of the Universe

Roger Blandford
Kavli Institute for Particle Astrophysics and Cosmology

Abstract

The Universe is a very big place and we can observe much more happening than we can access on Earth. Using observatories that can explore most of the electromagnetic spectrum as we as the cosmic ray, neutrino and gravitational radiation spectra - spanning roughly 150 octaves in total - we have seen extraordinary phenomena exhibiting extremes of power, energy, gravity, speed, density, pressure and temperature. Using these magnificent cosmic laboratories, we can also learn much about physics far, far beyond the reach of their terrestrial counterparts. In this overview I will highlight recent discoveries and explanations involving black holes, neutron stars and giant shock waves. I will also preview some opportunities for learning even more.

Oral Sessions

Oral Session 01

Main Conference Hall

1st Day, 13.02.2023

Education and Outreach Astronomy

Chairman: Roger Blandford
Co-Chairman: José Miguel

12:30-01:00	**IAU. The IUA is more than the eye sees** José Miguel Rodríguez Espinosa
01:00-01:15	**African Astronomical Society (AfAS): the voice of astronomy in Africa** Charles Takalana, Thebe Medupe
01:15-01:30	**Astronomy Outreach in Egypt: Tools and resources** Somaya Saad
01:30-01:45	**Robotic telescopes as an Educational Tool: LCO** Priya Shah
01:45-02:00	**Low cost Mobile Radio Telescopes: Relevant tools for Education and Outreach in developing countries** Ikechukwu Anthony Obi , Bonaventure Okere , Chukwujekwu Ofodum
02:00-02:15	**The application of indigenous knowledge system in cultural astronomy in kigezi region, Uganda** Habugisha Isaac, Katashaya R. Steven

IAU. The IUA is more than the eye sees

José Miguel Rodríguez Espinosa
Instituto de Astrofisica de Andalucía, 18008, Granda, Spain
espinosa@iap.fr

Abstract

how the IAU works, and how the IAU is organized as well as its activities”

Session: session 01
Abstract ID: 10

African Astronomical Society (AfAS): the voice of astronomy in Africa

Charles Takalana, Thebe Medupe
African Astronomical Society (AfAS), South Africa
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Abstract

The African Astronomical Society (AfAS) is a Pan-African Professional Society of Astronomers registered in South Africa as a non-profit, voluntary society. Our vision is to create and support a globally competitive and collaborative astronomy community in Africa. Our mission is to be the voice of astronomy in Africa and to contribute to addressing the challenges faced by Africa through the promotion and advancement of astronomy. AfAS's key objective is to develop Astronomy and Human Capacity throughout the continent of Africa through a vibrant and active AfAS. South Africa currently hosts the Secretariat of AfAS through the Department of Science and Innovation (DSI), and our office is located at the South African Astronomical Observatory (SAAO) in Cape Town. This talk will focus on the progress made by AfAS in contributing to science, outreach, communication, and education activities emanating from Astronomy in Africa since its relaunch in March 2019 and how AfAS is further enhancing collaboration among countries in Africa and institutions outside of the continent. Various AfAS-led flagship projects have also been initiated to strengthen astronomy activities in the continent further. The talk will also talk about the efforts of the African Network of Women in Astronomy. This initiative aims to connect women working in astronomy and related fields in Africa. Finally, the talk will give an update on AfAS membership and past and upcoming calls.

Session: session 01
Abstract ID: 46

Astronomy Outreach in Egypt: Tools and resources

Somaya Saad
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Abstract

Science in general represents a basic part of our culture and human conscience, since it is one of the sustainable development goals and pillars of societal progress.Astronomy is the most fascinating science, attracting people of all ages and arousing their curiosity. The astronomy for outreach and awareness are considered as one of the most important goals of the International Astronomical Union where the Office of Astronomy Outreach OAO plays a leading role in the field of astronomy communication. The National coordinators of Astronomy outreach (NOCs in Egypt) participating in achieving the goals of astronomy outreach and awareness with the general public through conferences, seminars, training , Astronomical Observation Camps, workshops and many other creative activities.Here we will share you the most important activities of astronomy outreach, and the tools, resources and the multiple elements that contributed to the success of this role in the Egyptian society.

Session: session 01
Abstract ID: 20

Robotic telescopes as an Educational Tool: LCO

Priya Shah
Maulana Azad National Urdu University, Hyderabad, India
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Abstract

We shall discuss our attempts at promoting the Las Cumbres Observatory Robotic Telescopes as an educational tool. Participants can get first hand experience of obsrevations, data analysis and interpretation using this data. We shall demonstrate how effectively this can be done.

Session: session 01
Abstract ID: 83

Low cost Mobile Radio Telescopes: Relevant tools for Education and Outreach in developing countries

Ikechukwu Anthony Obi , Bonaventure Okere , Chukwujekwu Ofodum
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Abstract

In developing countries, outreach activities in astronomy has over the years focus on optical astronomy with little or no activities carried in the radio counterpart due to the unavailability of ready made expensive radio telescopes or lack of expertise in building low cost ones. Moreover, professional radio telescopes can not be easily accessed by university students for teaching purposes due to it's high demand. We present the designs and performance of some affordable but effective mobile radio telescopes that will serve as an indispensable tool not only for outreach but also for education and training in radio astronomy at all levels. Making such telescopes affordable, compact and portable can be a daunting task but can be accomplished.

Session: session 01
Abstract ID: 111

The application of indigenous knowledge system in cultural astronomy in kigezi region, Uganda

Habugisha Isaac, Katashaya R. Steven
Kabale University, Ughanda
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Abstract

The application of indigenous knowledge system in cultural astronomy in kigezi region, Uganda

Oral Session 02

Main Conference Hall

2nd Day, 14.02.2023

Galaxies and Extra-Galaxies

Chairman: Massimo Capaccioli
Co-Chairman: Ashraf Shaker

09:30-10:00	**Galaxy Scaling Relations: Review and Perspectives** Massimo Capaccioli
10:00-10:15	**The Vera C. Rubin Observatory Legacy Survey of Space & Time (LSST): an Astronomical Data Set for the Future** Douglas Tucker
10:15-10:30	**Galaxy Morphologies in the core of Coma Cluster** S N Hasan , Nagamani Pologi , Priya Hasan
10:30-10:45	**Warps as a Tool To Understand Galaxies Formation** shaker, A.A. , Samir, R.M. , Reda, F.M.
10:45-11:00	**Statistical foundation for comparison in astronomy** Helal Ismaeil Abdel Rahman
11:00-11:15	**Machine Learning for Galaxy Classification** Nagamani Poloji , S N Hasan, Alaap Hasan
11:15-11:30	**Multiwavelength study of the Flat Spectrum Radio Quasar 3C 454.3** Eslam Elhosseiny , Mohamed hashad , Ali Takey , Saad Ata

Galaxy Scaling Relations: Review and Perspectives

Massimo Capaccioli
University of Naples Federico II, Italy

Abstract

Scaling relations are strong empirical or semi-empirical correlations found among observational/physical properties of galaxies such as mass, size, luminosity, colors and kinematical parameters. We may understand their importance in charactering and understanding galaxy structure, formation and evolution, by looking at the role played by a historical scale relation, Kepler's third law, in validating Newton's theory of gravitation. Galaxy scale relations are litmus tests and fine-tuning knobs for hydrodynamics or semi-analytic models of galaxies, tools to estimate galaxy distances, a way to discover new physical relationships, and much more. In this lecture, we shall review the subject from the methodological point of view, analyzing in particular the three main characteristics of scale relations (slope, intercept, and scatter) in the context of Ockham's razor. We shall present the results so far achieved and their consequence in our understanding of galaxies by connecting the observed scale relations with the physical mechanisms behind them. Finally, we will throw our eye into the near future to try to see what is around the corner in this field of research.

Session: session 02
Abstract ID: 84

The Vera C. Rubin Observatory Legacy Survey of Space & Time (LSST): an Astronomical Data Set for the Future

Douglas Tucker
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Abstract

The Vera C. Rubin Observatory Legacy Survey of Space & Time (LSST) will be a 10-year optical astronomical survey of the Southern sky, expected to start main survey operations in 2024. The survey will be conducted using a 3.2 Giga-pixel, 9.6 sq deg wide-field camera installed on the 8.4-m Simonyi Survey Telescope on Cerro Pachon in Chile. Under dark sky conditions, the r-band 5-sigma magnitude limit for a point source in a single 30-sec exposure is expected to be 24.40. The primary scientific goals of LSST are to probe dark energy & dark matter, to inventory the solar system, to explore the transient optical sky, and to map the Milky Way Galaxy. The data rate is estimated to be 20 Terabytes/night, or 15 Petabytes for the final, 10-year data set. This talk will cover the plans for the LSST survey strategy and data processing, and provide an overview of the different types of data products that will be generated for scientists, with a focus on which will be world-public and when they will become available.

Session: session 02
Abstract ID: 94

Galaxy Morphologies in the core of Coma Cluster

S N Hasan[1] , Nagamani Pologi[2] , Priya Hasan[1]
[1]*Maulana Azad National Urdu, University, Hyderabad, INdia*
[2]*Osmania University, Hyderabad, India*
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Abstract

Using data from the HST/ACS Coma Cluster Treasury Survey, we report the structural characteristics and morphology of galaxies in the centre region of the Coma Cluster brighter than 19.5 m in the F814W band. From our sample of 219 galaxies, we find 132 members mostly using spectroscopic redshifts. We identify 81 dwarfs and 51 non-dwarfs in our sample of 132 members, and we find 4 dwarfs and 28 non-dwarfs among our 32 non-members. The redshifts of the remaining 55 galaxies are unknown.We use GALFIT to present the sample's bulge-disc decomposition and acquire sample parameters. We classify the galaxies morphologically using visual examination of residuals. We studied the relation of morphological types with Bulge to Total Light Ratio (B/T), color magnitude relation (CMR), S\'ersic index (n), Kormendy relation and cross-correlations between these parameters for the bulges and galaxies.

Session: session 02
Abstract ID: 97

Warps as a Tool To Understand Galaxies Formation

shaker, A.A. , Samir, R.M. , Reda, F.M.
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Abstract

Warps in spiral galaxies has been detected some decades ago from early 21 cm observations. Now radio and optical warps were detected in spiral, elliptical, and Lenticular galaxies. The numerous mechanisms that have been proposed and explored for warps have not yet given a definitive and satisfactory answer. Understanding the way of warps mechanism in different galaxies types will Answer many unanswered questions related to galaxies formation and evolution.

Session: session 02
Abstract ID: 50

Statistical foundation for comparison in astronomy

Helal Ismaeil Abdel Rahman
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Abstract

Observational data has long been used in astronomy to estimate parameters and quantify uncertainty in physical models. Many statistical techniques have been developed in response to astronomical problems, ranging from classical least squares estimation to modern methods such as nested sampling. Advances in data collection in the late twentieth century, such as telescope automation and the use of CCD cameras, resulted in a dramatic increase in data size and complexity, resulting in a surge in the use and development of statistical methodology.This review discussed some of the statistical methods used to compare physical models. There are many statistical methods used in astronomy, but each technique needs two criteria for selection, the type of data and the purpose of the study. Some methods used for comparisons in astronomy, such as the correlation between variables, the methods of estimating the parameters such as the least squares method (LS), Maximum Likelihood Method (ML), Bayes Estimation, and the Minimum Chi-Square Method. Testing hypotheses such as the methodology, Single Sample Goodness-of-Fit Test, and Comparison of Two Independent Samples. Some examples of statistical comparison studies in Astronomy are discussed.Kew words: Astrostatistics: statistical comparison, correlation coefficient, testing hypothesis and estimation.escription here.

Session: session 02
Abstract ID: 107

Machine Learning for Galaxy Classification

Nagamani Poloji[1] , S N Hasan[2], Alaap Hasan[3]
[1]*Osmania University, Hyderabad, India*
[2]*Maulana Azad National Urdu University, Hyderabad*
[3]*IIT Bangalore, India*
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Abstract

We will use HST Data of the Coma Cluster for which morphology has been studied in an earlier paper. We shall use machine learning to classify galaxies and look for morphological features like bars, spiral arms and bulge types using GALFIT output of galaxy and residual images.

Session: session 02
Abstract ID: 45

Multiwavelength study of the Flat Spectrum Radio Quasar 3C 454.3

Eslam Elhosseiny[1] , Mohamed hashad[2] , Ali Takey[1] , Saad Ata[1]
[1]*National Research Institute of Astronomy and Geophysics (NRIAG), EGYPT*
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Abstract

Flux temporal variability is an important observational property for blazars across the whole electromagnetic spectrum, which could convey information regarding the physical processes and constrain the emission region. In this work, we study the time variability of the FSRQ 3C 454.3 (z=0.859), the brightest and highest variability blazar in Fermi-LAT catalog, in different energy bands (high energy γ-ray by using Fermi-LAT data, X-Ray by using Swift-XRT data, and Optical/NIR by using SMART and 1.88m KAO telescope). Different statistical methods have been applied such as cross-correlation function to study the variation and identify the timescales. We searched for periodicities by using different approach e.g. generalized Lomb-Scargle periodogram and weighted wavelet z-transform. Significant correlation between the light curves at different energy bands were found.

Oral Session 03

Medour Conference Hall

2nd Day, 14.02.2023

Solar Physics and Space Weather

Chairman: Nat Gopalswamy
Co-Chairman: Rabab Helal

12:00-12:30	**Solar and Stellar Coronal Mass Ejections** Nat Gopalswamy
12:30-01:00	**Space Weather: Monitoring and Forecasting the Activity Ramp-Up of Solar Cycle 25** Kamen Kozarev
01:00-01:15	**Prediction verification of solar cycle 25 based on the precursor methods** R. H. Hamid , A. Abulwfa
01:15-01:30	**Deep Learning Approach to Forecast the Integral Flux of the Solar Energetic Protons** Mohamed Nedal , Kamen Kozarev , Nestor Arsenov , Peijin Zhang
01:30-01:45	**Statistical Method Prediction of the Sunspots Number during Solar Cycle 25** M. A. Semeida , H. Abdel-Rahman
01:45-02:00	**Correlation between space weather events during extreme geomagnetic storms: analytical study** Susan Wassem Samwel, Rositsa Miteva

Space Weather: Monitoring and Forecasting the Activity Ramp-Up of Solar Cycle 25

Kamen Kozarev
Institute of Astronomy and National Astronomical Observatory of the Bulgarian Academy of Sciences, Bulgaria

Abstract

The next solar cycle 25 is ramping up, and already defying the expectations of a weak cycle. Together with the increase of solar activity, a number of space missions are entering preparatory phases, getting ready for launch, or already returning valuable new results. Parker Solar Probe and Solar Orbiter have already completed a number of orbits around the Sun, and their scientific findings about the inner heliosphere are defying existing theories of the solar wind and energetic particles. New space- and ground-based instruments are being developed for monitoring solar activity and space weather, in wavelengths ranging from X-rays to radio. In this talk, I will review some of the recent advances, missions, and modeling initiatives in space weather monitoring and forecasting. I will also take a look toward future efforts in the field.

Session: session 03
Abstract ID: 25

Prediction verification of solar cycle 25 based on the precursor methods

R. H. Hamid , A. Abulwfa
National Research Institute of Astronomy and Geophysics (NRIAG), EGYPT
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Abstract

Prediction of the level of sun activity is vital for all space programs, planning of space mission and space weather operators. Some prediction have been made using different methods with value was drastically different. In this paper, we carry out a verification of an early prediction of solar cycle 25th and forecast the next solar cycle 26th. However we used three solar variables, spotless events (SLE), along the preceding minimum of each cycle, geomagnetic index aa minimum and solar flux 10.7cm data sets as precursors for prediction of the maximum value of Rz and the time of rise Tr. Our results give using spotless events: R25=108.58 for ensuing maximum and T25=4.2 years, for aamin R26=110.86, T26=4.14 years and finally for F10.7 R25=135.5 and T25=4.4 years, R26=129.74 and T26=4.1years.

Session: session 03
Abstract ID: 11

Deep Learning Approach to Forecast the Integral Flux of the Solar Energetic Protons

Mohamed Nedal , Kamen Kozarev , Nestor Arsenov , Peijin Zhang
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Abstract

Solar energetic particles (SEPs) are mainly protons and originate from the Sun during solar flares or coronal shock waves. Forecasting the SEP flux is critical for several operational sectors, such as communication and navigation systems, space exploration missions, and aviation flights, as the hazardous radiation may endanger astronauts', aviation crew and passengers' health, as well as the delicate electronic components of satellites, space stations, and ground power stations. Therefore, the prediction of SEP flux is of high importance to our lives and may help mitigate the negative impacts of one of the serious space weather transient phenomena on the near-Earth space environment. Numerous SEP prediction models are being developed with a variety of approaches, such as empirical models, probabilistic models, physics-based models, and AI-based models. In this work, we use the bi-directional long short-term memory neural network model architecture (Bi-LSTM) to train SEP forecasting models for three standard integral GOES channels (>10 MeV, >30 MeV, >60 MeV) with three long-term forecast windows (3-day, 5-day, and 7-day ahead) and three short-term forecasting windows (6-hour, 12-hour, and 24-hour ahead) based on daily and hourly data, respectively, obtained from the OMNIWeb database from 1976 to 2019. As the SEP variability is modulated by the solar cycle, we select input parameters that capture the short-term and long-term variability of the solar activity. We take the F10.7 index, the sunspot number, the logarithmic scale of the x-ray flux, the solar wind speed, and the average strength of the interplanetary magnetic field as input parameters to our model. The results are validated with an out-of-sample testing set and benchmarked with different types of other models. In addition, comparisons with other works are reported.

Session: session 03
Abstract ID: 41

Statistical Method Prediction of the Sunspots Number during Solar Cycle 25

M. A. Semeida , H. Abdel-Rahman
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Abstract

Solar cycle 25 is the current solar cycle, the 25th since 1755, when extensive recording of solar sunspot activity began. It began in December 2019 with a minimum smoothed sunspot number, it is expected to continue until about 2030.In this work, we applied a statistical method " Autoregressive Integrated Moving Average Models" (ARIMA) on Sunspots number.Our used data were observed by National Oceanic and Atmospheric Administration (NOAA) during the period from 1986 to 2022, (36 years).The number of sunspots reaching a smoothed maximum of a 115 in July 2025, This prediction is in line with thecurrent general agreement in the scientific literature, which holds that solar cycle 25 will be weaker than average (i.e. weaker than during the expectionally strong Modern maximum).

Session: session 03
Abstract ID: 31

Correlation between space weather events during extreme geomagnetic storms: analytical study

Susan Wassem Samwel[1], Rositsa Miteva[2]
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Abstract

We study the correlation between the different space weather events parameters associated with intense geomagnetic storms occurred during the solar cycles 23&24. The space weather events under this study are the Solar Flares (SFs), Coronal Mass Ejections (CMEs), Geomagnetic Storms(GS), Solar Energetic Protons(SEPs) and Electrons (SEEs). The severity of the geomagnetic storms is identified based on the Disturbance Storm Time (Dst) ≤ -100 nT. A list of 107 geomagnetic storms with the associated space weather events is obtained. The utilized procedure of association between the different space weather events parameters is described. The properties of the different space weather events understudy are represented. For the presented analysis, Pearson correlation is employed. Results are summarized and discussed.

Oral Session 04

Kobeasy Conference Hall

2nd Day, 14.02.2023

Galaxies and Extra-galaxies (2)

Chairman: Jose Vilchez
Co-Chairman: Hadia Selim

12:00:12:30	**The metal content and ionizing photons budget of star-forming galaxies** Jose Vilchez
12:30-12:45	**HD 60435 - and enigmatic roAp star** Thebe Medupe
12:45-01:00	**Atomic Gas as a Critical Test of Galaxy Evolution in Cosmological Simulations** Lerothodi Leeuw
01:00-01:15	**The Evolution of Brightest Cluster Galaxies in the Nearby Universe** Rasha Samir , Fatma Reda , Ashraf Shaker
01:15-01:30	**MeerKAT HI line observations of the nearby interacting galaxy pair NGC1512/1510** Edward Elson
01:30-01:45	**Resolved studies of the gas in nearby galaxies with SALT and other telescopes** Moses Mogotsi
01:45-02:00	**ATCA Study of Small Magellanic Cloud Supernova Remnant 1E 0102.2–7219** Rami Alsaberi

The metal content and ionizing photons budget of star-forming galaxies

Jose Vilchez
CSIC-Spanish Research Council, Spain

Abstract

Recent results on the chemical composition and the nature of the ionizing stellar populations of star-forming galaxies are shown, with a special emphasis on the family of dwarf galaxies. Deep integral field spectroscopy of an extended sample of dwarf galaxies with active star formation has been performed. The data allowed us to derive their chemical composition (oxygen, nitrogen, neon, among others), to explore their spatial structure, chemo-dynamics and the ionization budget from their massive stars. An overview of the obtained results will be presented and discussed in the light of recent findings on the metallicity-mass-star formation relation of these galaxies and their ionizing stellar populations.

Session: Session 04
Abstract ID: 112

HD 60435 - and enigmatic roAp star

Thebe Medupe
African Astronomical Society (AfAS), South Africa

Abstract

HD 60435 is a member of roAp stars that are characterised by short pulsation periods (between 4.7 and 25.8 min), chemical peculiarities and strong magnetic fields (with strengths of up to 34kG). Matthews et al 1986 found several frequencies in the ground-based photometric data of this star ranging from 70 to 124 c/d. Space based observations from TESS show six principal frequencies ranging from 112 until 124 c/d. A plot of these frequencies over rotation cycles of this star reveal that there are times where none of the six periods are excited whereas on some nights only a few of the periods are visible. This behaviour of growth and decay of pulsations in some roAp stars was first reported in HD217522 and has not been properly explained since. The TESS data of this star challenges the models of pulsation excitation mechanism of roAp stars in general. I will present the TESS data to demonstrate this behaviour.

Session: Session 04
Abstract ID: 21

Atomic Gas as a Critical Test of Galaxy Evolution in Cosmological Simulations

Lerothodi Leeuw
University of the Western Cape (UWC), South Africa
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Abstract

We will give an update on our work using atomic gas as a critical test of galaxy evolution in cosmological simulations. Comparison is made using observational data and cosmological simulations that include SIMBA, EAGLE and TNG.

Session: session 04
Abstract ID: 92

The Evolution of Brightest Cluster Galaxies in the Nearby Universe

Rasha Samir , Fatma Reda , Ashraf Shaker
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Abstract

Brightest Cluster Galaxies (BCGs) are located at the center of their host clusters. They are usually super massive elliptical galaxies which form and grow by mergers with other galaxies. They are among the most massive galaxies in the Universe, and the study of their properties comprises a pivotal step towards an inclusive understanding of the evolution of galaxies. We study the physical properties of a large sample of BCGs that covers a wide redshift range and see if their characteristics change with redshift. We explore some scaling relations such as size-luminosity, Kormendy and Faber-Jackson relations of BCGs. We find an evidence for curvature in these relations as mentioned in previous studies, which indicates that the most luminous galaxies tend to have smaller velocity dispersions and larger sizes than expected. We find a correlation between physical properties of BCGs (the effective radius, absolute magnitude and central velocity dispersion) and their host clusters velocity dispersions. This relation suggests that the most massive clusters host larger central galaxies.

Session: session 04
Abstract ID: 36

MeerKAT HI line observations of the nearby interacting galaxy pair NGC1512/1510

Edward Elson
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Abstract

I will present the results of a study based on MeerKAT HI line imaging of the nearby interacting galaxy pair NGC 1512/1510. The data yield high-fidelity image sets characterised by an excellent combination of high angular resolution, dynamic range and sensitivity, thereby offering the most detailed view of this well-studied system's neutral atomic hydrogen content. We find the stellar bulge and bar of NGC 1512 to be located within a central HI depression where surface densities fall below 10^20 atoms/cm^2, while the galaxy's starburst ring coincides with a well-defined HI annulus delimited by higher surface densities. Our high-resolution imaging is used to quantitatively explore the spatial correlation between HI and far-ultraviolet flux over a large range of HI mass surface densities spanning the outer disk. The results indicate the system's HI content to play an important role in setting the pre-conditions required for wide-spread, high-mass star formation. This work serves as a demonstration of the remarkable efficiency and accuracy with which MeerKAT can image nearby systems in HI line emission. Detailed analyses such as ours will be instructive for the interpretation of observations of high-redshift galaxies carried out with new radio facilities such as MeerKAT.

Session: session 04
Abstract ID: 53

Resolved studies of the gas in nearby galaxies with SALT and other telescopes

Moses Mogotsi
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Abstract

Studies of the gas kinematics and properties of nearby galaxies are crucial in order to understand the baryon cycle and the evolution of galaxies. We have been utilizing Southern African Large Telescope's optical spectrograph (RSS), to study the ionized gas and kinematics of galaxies as a part of multiple surveys. These studies are being used in conjunction with work from telescopes such as MeerKAT in order to understand the nature of gas and star formation in environments with different densities. I will present the preliminary results from our SALT studies of gas flows in galaxies from different environments. In addition to that I will present how we are combining that with radio and mm data from MeerKAT and ALMA to obtain a multi-wavelength view of the baryon cycle in these systems.

Session: session 04
Abstract ID: 1

ATCA Study of Small Magellanic Cloud Supernova Remnant 1E 0102.2–7219

Rami Alsaberi
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Abstract

We present new and archival Australia Telescope Compact Array and Atacama Large Millimeter/submillimeter Array data of the Small Magellanic Cloud supernova remnant 1E 0102.2-7219 at 5500/9000 and 108000 MHz. The remnant shows a ring-like morphology with a mean radius of 6.6 pc. The 5500 MHz image shows a bridge-like structure seen for the first time in a radio image. This structure is consistent with both optical and X-ray images. In the 9000 MHz image we detect a central feature, but rule out a pulsar wind nebula origin as this central feature is unpolarised. The mean fractional polarisation for 1E 0102.2-729 is 7±1 and 12±2 per cent for 5500 and 9000 MHz. The spectral index for the whole remnant is α=-0.64±0.01. The line-of-sight magnetic field strength is estimated at 44.2 μG and an equipartition field is 71.3/151.4 μG. We detect an HI cloud towards this remnant at the velocity range of ~160-180 km s-1 and a cavity-like structure at the velocity of 163.7-167.6 km s-1. We did not detect CO emission towards 1E 0102.2-7219.

Oral Session 05

Main Conference Hall

2nd Day, 14.02.2023

Stellar Astronomy

Chairman: Priya Shah
Co-Chairman: Anas Osman

03:00-03:30	**Star Clusters: The Rosetta Stone of Stellar Evolution** Priya Shah
03:30-03:45	**The astrophysical parameters of Majaess-95 and Majaess-225.** Tadross, A. L.
03:45-04:00	**Assessing the complexity of orbital parameters after asymmetric kick in binary pulsars** Ali Taani
04:00-04:15	**On the discovery of a new Algol eclipsing binary system using Kottamia optical telescope** Mohamed S. Darwish , Ibrahem Zead , Somaya S. Mohamed
04:15-04:30	**ON THE ELLIPTICITY OF THE GLOBULAR CLUSTER M2** Svetoslav Botev
04:30-04:45	**Spectroscopic Observations of Classical Novae Using Kattamia Faint object Spectropolarimeter (KFISP)** Gamal M. Hamed, Saad Ata, Mohamed Soliman, Mohamed Abdel-Sabour, Ibrahim Zead, Tarek M Kamel, Diana Fouda
04:45-05:00	**A Photometric study of four W UMa binaries in the direction of Globular Cluster NGC 3201** D. Shanti Priya, Dereje Wakgari, J. Rukmini
05:00-05:20	**The Southern African Large Telescope: from vision to reality** David Buckley

Star Clusters: The Rosetta Stone of Stellar Evolution

Priya Shah
Maulana Azad National Urdu University, Hyderabad, India

Abstract

Star clusters are unique laboratories made of stars born from the same molecular cloud, at the same distance and of the same chemical composition, differing only in mass. Hertzsprung Russell diagrams of star clusters are excellent tracers of stellar evolution which enable us to find distances and ages of star clusters using isochrones. In this talk, I shall give a brief overview of research on the formation, evolution, and dynamics of star clusters at the Kottamia Observatory. I shall conclude with the most recent results obtained with Gaia data and the open questions on the studies of star clusters.

Session: session 05
Abstract ID: 39

The astrophysical parameters of Majaess-95 and Majaess-225.

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Abstract

Most astrophysical parameters of the two stellar clusters Majaess 95 and Majaess 225 have been investigated for the first time using the third data release of the Gaia space mission (Gaia-DR3). Knowing the proper motions and parallaxes of the stars of the two clusters, we define the actual cluster members. Therefore, the ages, reddening, and heliocentric distances of the two objects could be estimated. The luminosity function, mass function, total mass, and relaxation time were also determined.

Session: session 05
Abstract ID: 62

Assessing the complexity of orbital parameters after asymmetric kick in binary pulsars

Ali Taani
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Abstract

The dynamical characterization of the Millisecond Pulsar (MSP) parameters is a key issue in understanding these systems. We present an analytical analysis of the orbital parameters of binary MSPs with long periods (Porb>2d) and circular (e ≤0.1) orbits, produced by an asymmetric kick model imparted during the Accretion Induced Collapse (AIC) of white dwarfs process. It turns out that the distribution of orbits peaks up to Porb,f≤90 d with strong circularization. Considering the different assumptions about the distribution of companion He stars 3M≤Mcom≤5M, the binary will affect the setups of the balance condition of minimum energy. Our analytical approach is just the first approach to the more complete models required for describing all binary parameters after an asymmetric kick. Therefore, we have also run some numerical simulations in order to compare their results with the analytical studies. We aim to initiate a first exploration of the full complexity of the problem when combining a variable kick time and a variable kick vector direction. Indeed, the numerical simulations show patterns resembling the complex behavior found in chaotic scattering problems. Although we deal with a deterministic problem and bounded orbits, the regular characteristic orbits are found in more realistic phases during the AIC process. In addition, the overall process can show complex behaviors strongly associated with the internal kick mechanisms. This would lead us to identify the nature of regular orbits and their orbital morphology

Session: session 05
Abstract ID: 61

On the discovery of a new Algol eclipsing binary system using Kottamia optical telescope

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Abstract

In this paper, we report the discovery of a new eclipsing binary system using Kottamia Astronomical Observatory(KAO). The system is classified based on the light curve shape as Algol type with a period calculated to be ~ 4.5 days. data from KAO as well as ZTF (Zwicky Transient Facility) is accumulated and a new ephemeris for the system is estimated. initial physical, as well as geometrical parameters for the system, are presented.

Session: session 05
Abstract ID: 14

ON THE ELLIPTICITY OF THE GLOBULAR CLUSTER M2

Svetoslav Botev
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Abstract

The ellipticity is one of the most important structural parameters of globular clusters (GC). However, among 157 classified as GC by Harris, only 102 have ellipticities. We aimed at measuring the ellipticity of the GC M2 by the means of selection of stars, which belong to the cluster, according to their position on the HR-diagram and their spatial distribution on the view plain. We used g and r photometry from Pan-STARRS Catalog data release 1 chambers 2016, in order to be precise in estimation of not the ellipticity itself, but its errors in their variance with the distance from the center of M2.

Session: session 05
Abstract ID: 32

Spectroscopic Observations of Classical Novae Using Kattamia Faint object Spectropolarimeter (KFISP)

Gamal M. Hamed[1], Saad Ata[1], Mohamed Soliman[2], Mohamed Abdel-Sabour[1], Ibrahim Zead[1], Tarek M Kamel[1], Diana Fouda[1]

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Abstract

In late 2021, we have started a campaign to perform spectroscopic follow up observations for classical novae (CNe) in different stages of their spectroscopic evolution using the Kattamia Faint Object Spectro-Polarimeter (KFISP) of the Kattamia Astronomical Observatory. The campaign has been going for about a year now and here we present preliminary results. In this work we present spectroscopic observations of the three CNe, GK Per, Nova Per 2020 and Nova Cas 2021. We identify the spectral lines and measure their fluxes which are used to identify the elements present in the ejected envelope and helps in studying the physical and chemical properties of the ejected envelope and the underlying white dwarf.

Session: session 05
Abstract ID: 104

A Photometric study of four W UMa binaries in the direction of Globular Cluster NGC 3201

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Abstract

Globular clusters are important for studying variable stars because they form as progenitors from the same gas cloud. In the current work we investigate the photometric data of four W UMa binaries in the direction of globular cluster NGC 3201, using PHOEBE, based on Wilson-Devinney code. From the photometric solutions, the absolute parameters have been estimated. The dynamical stability of the variables were studied and they are found to be within stable region. Their evolutionary nature is discussed using the mass-luminosity relations. The secondaries are found to be over-luminous. However, the primaries are found to be near ZAMS. The rate of AML's were estimated and the consequences are discussed.

Session: session 05

The Southern African Large Telescope: from vision to reality

David Buckley
South African Astronomical Observatory (SAAO), South Africa

Abstract

This talk will cover the history of the SALT project, from the initial modest 4-m class concept in the mid-1990s to its eventual realization as a 10-m telescope, the largest in the southern hemisphere, for which construction was completed in 2005. The initial efforts to motivate for the telescope and the attempts to raise support and find partners, eventually leading to the “green light” in 1999, will be described. The remainder of the talk will discuss the design, construction, commissioning and eventual steady-state transition of SALT into a competitive state-of-the-art astronomical facility, producing forefront research. Some highlights of this will be presented in the area of my own research in transient and compact objects. Future SALT science plans will be described plus the recent initiatives to develop intelligent networks of telescopes, in South Africa and on the African continent, aimed to support the increasing demand for automated transient follow-up observations, particularly in the era of the Rubin Observatory’s Legacy Survey of Space and Time (LSST)..

Main Conference Hall
3rd Day, 15.02.2023
Time: 9:30-10:00

The observations of the space debris and the near earth objects

Liu Jing
National Astronomical Observatory of the China Academy of Sciences

Abstract

This paper introduces the characteristics and motion laws of space debris and near-Earth objects, discusses the feasibility of using astronomical optical telescopes to carry out comprehensive observations, introduces the specification parameters and observation status of the Yaoguang Telescope of the National Astronomical Observatory in China, and looks forward to the future of time-domain astronomy research on fast-moving and changing celestial bodies using the telescope.

Oral Session 06

Medour Conference Hall

3rd Day, 15.02.2023

Modern Observation

Chairman: Makram Ibrahim
Co-Chairman: Kamen Korazev

10:00-10:15	**Determination of the True Dawn by Several Different Ways at Fayum in Egypt** Yasser A. Abdel-Hadi, M. G. Rashed, U. A. Rahoma, A. H. Hassan
10:15-10:30	**Astronomy and big data** Areg Mickaelian
10:30-10:45	**Search and study of the Near-Earth objects within small telescope at NRIAG-Egypt** A.M. Abdelaziz, S.K. Tealib
10:45-11:00	**Photometric Study of Chariklo** Josephin Inodhimbwa Titus
11:00-11:15	**Orbital characteristics of space objects in GEO orbits from Optical surveys** Esraa A. El-Aziz, A. M. Abdelaziz, Magdy Y. Amin, Khattab, E.H, S. K. Tealib

Session: session 06
Abstract ID: 13

Determination of the True Dawn by Several Different Ways at Fayum in Egypt

Yasser A. Abdel-Hadi, M. G. Rashed, U. A. Rahoma, A. H. Hassan
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Abstract

This research is a new addition to the previous work done in Egypt to determine the exact time of the true dawn due to the urgent need of society for that. Twilight observations were carried out by SQM and the naked eye (N.E.) in the high visibility conditions for the morning twilight sky in the time interval (2018-2019) at Fayum in Egypt (29° 17′ N, 30° 03′ E, 50 m Elev.). The true dawn is found to be appear between Do≈14° to 14.8° according four different criteriaapplied in this work;(1) the threshold of eye in the magnitude, which is as 0.83mfrom the full night (Abdel-Hadi and Hassan (2022) (I and II)), (2) the naked eye observations by the group, (3) the relation: H (Horizontal) =πZ (Zenith), (4) at 0.015 cd/m2 as minimum energy for the mesopic region of twilight. The observations show that the clouds absorb about 19% of the energy (cd.m-2.degree-1) during the full night(Do=26.5˚-18˚), about 2.5% of the energy (cd.m-2.degree-1) during the twilight period (Do=18˚- 2.5˚) from the rays falling on. : Sun vertical depression, True dawn, Desert area, SQM, Naked eye observations, threshold of the eye.

Session: session 06
Abstract ID: 109

Astronomy and big data

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Abstract

Astronomy is now entering to Big Data era. Most of the data in science comes from the Universe, as the scales are quite different; there is a vast amount of data in the Universe compared to the Earth, where all other sciences have been developed. Astronomical surveys and catalogs are the main sources for Big Data and the discovery of new objects, both Galactic and extragalactic. Archives and Databases maintain billions of astronomical objects; planets, comets, stars, exoplanets, nebulae, galaxies, and quasars. We will review the current background in astronomy for further all-sky or large-area studies. Modern astronomy is characterized by multiwavelength (MW) studies (from gamma-ray to radio) and Big Data (data acquisition, storage and analysis). Present astronomical databases and archives contain billions of objects observed at various wavelengths, and the vast amount of data on them allows new studies and discoveries. Surveys are the main source also for accumulation of observational data for further analysis, interpretation, and achieving scientific results. Major gamma-ray, X-ray, UV, optical, IR, submm/mm and radio surveys and major astronomical archives and databases will be presented and discussed.

Session: session 06
Abstract ID: 70

Search and study of the Near-Earth objects within small telescope at NRIAG-Egypt

A.M. Abdelaziz, S.K. Tealib
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Abstract

The development and research of near-Earth space (NES) have led to the awareness of the so-called space threats–asteroid hazards and problems associated with technogenic contamination of the so-called “space debris” (SD). The tasks of detecting and cataloging of near-Earth asteroids (NEA), investigating the evolution of their orbits, and studying their physical and mineralogical properties are extremely important. The tasks of studying, modeling, and preventing manmade threats to the implementation of space activities are also more urgent than ever before. Both of these tasks are united by an approach to their study – to research them, you need scientific tools in the form of a geographically distributed network of optical telescopes that cover all longitudes of the globe. Within our collaboration with International Scientific Optical Network (ISON) for optical observation. We present an approach for finding and tracking small and fast near-earth asteroids (NEAs)and initiated observations from the Optical Satellite Tracking Station (OSTS) at the National Research Institute of Astronomy and Geophysics (NRIAG), Egypt. The aim of this work establishes an observation program for NEAs tracking at OSTS, to Create a database for astrometric observations of minor planets or irregular natural satellites, all of which would contribute to global knowledge of position data and be stored in the MPC

Session: session 06
Abstract ID: 44

Photometric Study of Chariklo

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Abstract

The Centaur object (10199) Chariklo is the only small object of the solar system known to show the presence of a ring system. A number of researcher have looked at the photometric study of Chariklo as well as developing disk-integral functions of other bodies such as asteroids, but none have developed a disk-integral function of Chariklo. Knowledge of the disk-integral function of Chariklo is of significance importance as it allow us to study more about its physical properties. This study developed a disk-integral function of Chariklo by making use of its photometric properties. The study utilized data obtained from Cuno Hoffmeister Memorial Observatory (CHMO's) 36-cm telescope, which are from observations taken in 2016. The data were analyzed using the sbpy python code for small bodies. The code provide routines for photometric phase curve modeling of small bodies as well as retrieving sbpy's build-in filter band passes. It also defines the classes to implement the adopted disk-integrated phase function models for atmosphere-less solar system objects.

Session: session 06
Abstract ID: 71

Orbital characteristics of space objects in GEO orbits from Optical surveys

Esraa A. El-Aziz[1], A. M. Abdelaziz[1], Magdy Y. Amin[2], Khattab, E.H[2], S. K. Tealib[1]
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Abstract

observing the sky is a necessity to protect satellites from space debris collisions. Most studies are focused on space debris classification in the LEO region and produced a reasonable database covering all size ranges. Our aim in this study is to detect and update the GEO catalog regularly of high-value assets in congested orbit regimes, where the information about the distribution of space objects in the geostationary region is still comparatively sparse. In this paper, we have focused our study on the physical characteristics of GEO objects which include measuring the brightness (light curves) and position (orbital arcs) over time during the survey of the GEO region conducted using the Optical Satellite Tracking Station (OSTS) at the National Research Institute of Astronomy and Geophysics (NRIAG), Egypt. The presented work investigated the algorithmic performance in the context of maintaining a rolling catalog of objects for a future monitoring system, providing a commentary on the observational Strategies to keep in mind when finalizing a design.: Orbital characteristics, Optical survey, light curves, geostationary

Oral Session 07

Kobeasy Conference Hall

3rd Day, 15.02.2023

Dynamical Astronomy

Chairman: Zinovy Malkin
Co-Chairman: Nabil Awadalla

10:00-10:15	**Light curve solution of the contact eclipsing binary USNO-A2.0 675-20677511** N.S. Awadalla , M.A., Elkhamisy , M.A., Hanna
10:15-10:30	**Orbital Parameters of three Eclipsing Detached Binaries with Eccentric Orbits from the USNO** Magdy Hanna, Hyman, M., Nakhlawy, A., Dwidar, H., Elkhmisy, M., Essam, A.
10:30-10:45	**Light Curve Analysis for the Two Eccentric Variable Stars V869 Car and V2184 Sgr** Magdy Hanna, Hyman, M., Ahmed Nakhlawy, Dwidar, H., ElKhamisy, M., Essam, A.
10:45-11:00	**Light curve analysis for two eccentric variable stars EM Cet and EL Cen** Magdy Hanna, Hyman, M., Ahmed Nakhlawy, Hany Dwidar, ElKhamisy, M., Essam, A.
11:00-11:15	**Fractional Derivative Study of The Relativistic Polytrope** M. S. .Aboueisha, Mohamed I. Nouh, Eamad A-B. Abdel-Salam, Tarek M. Kamel, M. M. Beheary, Kamel A. Gadallah
11:15-11:30	**Computation of Some Families of Frozen Orbits in the Field of Lunar Gravity** osama ramla,W. A. Rahoma, F. A. Abd El-Salam, E. S. Kattab

Session: session 07
Abstract ID: 96

Light curve solution of the contact eclipsing binary USNO-A2.0 675-20677511

N.S. Awadalla , M.A., Elkhamisy , M.A., Hanna
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Abstract

We performed the first analysis of the light curve of the contact eclipsing binary USNO-A2.0 675-20677511 using the PHOEBE code. The fundamental parameters were determined. Based on the obtained solution, we discussed the evolutionary status of the components.

Session: session 07
Abstract ID: 93

Orbital Parameters of three Eclipsing Detached Binaries with Eccentric Orbits from the USNO

Magdy Hanna[1], Hyman, M.[2], Nakhlawy, A.[1], Dwidar, H.[2], Elkhmisy, M.[1], Essam, A.[1]
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Abstract

We present the precise values of the eccentricity and periastron angle of three detached, eccentric, eclipsing stars from the observations of the US-Noval Observatory. The temperatures and relative radii of their components as well as their mass ratios were calculated based on approximate values of the empirical relations of MS stars. The light curves are also solved by the PHOEBE code.

Session: session 07
Abstract ID: 87

Light Curve Analysis for the Two Eccentric Variable Stars V869 Car and V2184 Sgr

Magdy Hanna[1], Hyman, M.[2], Ahmed Nakhlawy[1], Dwidar, H.[2], ElKhamisy, M.[1], Essam, A.[1]
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Abstract

We present the first light curve analysis for the two eccentric eclipsing Algol-type binaries V869 Car, and V2184 Sgr by using the PHOEBE code. The chosen stars were selected from the PZP Catalogues. The light curves used in this study are from the OgleII project and ASAS survey. Preliminary orbital and physical parameters are determined. The analysis show e, ω and qph equal 0.07023± 0.0008; 170°.63 ± 3°.04, and 0.951± 0.008 for V869 Car, while 0.43516 ± 0.0018, 6°.15 ± 1°.6 and 0.885 ± 0.050 for V2184 Sgr.

Session: session 07
Abstract ID: 86

Light curve analysis for two eccentric variable stars EM Cet and EL Cen

Magdy Hanna[1], Hyman, M.[2], Ahmed Nakhlawy[1], Hany Dwidar[2], ElKhamisy, M.[1], Essam, A.[1]
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Abstract

We present the first light curve analysis of two eccentric variable stars EM Cet and EL Cen by means of PHOEBE code v0.31. The selected stars were taken from the Peremennye Zvezdy Prilozhenie supplement (PZP). Both were observed by the All Sky Automated Survey (ASAS) in the V band. Orbital and physical parameters are determined. The analysis shows that EM Cet is of late spectral type F7.4+G6.9 while EL Cen is earlier with F3.3+F5.3.

Session: session 07
Abstract ID: 35

Fractional Derivative Study of The Relativistic Polytrope

M. S. .Aboueisha[1], Mohamed I. Nouh[1], Eamad A-B. Abdel-Salam[2], Tarek M. Kamel[1], M. M. Beheary[3], Kamel A. Gadallah[3]

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Abstract

Relativistic effects play an essential role in many stellar configurations, such as white dwarfs, neutron stars, black holes, supermassive stars, and star clusters. The Tolman-Oppenheimer-Volkoff (TOV) equation of the polytropic gas sphere is ultimately a hydrostatic equilibrium equation derived from the general relativity framework. The present work presents a series solution for the fractional TOV equation. The solutions are performed in the frame of modified Riemann Liouville derivatives. Using power series expansions in solving fractional TOV equations yields a limited physical range to the convergent power series solution. A combination of the two techniques of Euler-Abel transformation and Padé approximation has been done to improve the convergence of the obtained series solutions. We calculated twenty fractional gas models for the polytropic indexes n=0, 0.5, 1, 1.5, 2, and some appropriate relativistic parameters. We constructed mass-radius relations and density profiles for the calculated models and applied them to the structure of the neutron stars.

Session: session 07
Abstract ID: 43

Computation of Some Families of Frozen Orbits in the Field of Lunar Gravity

osama ramla,W. A. Rahoma, F. A. Abd El-Salam, E. S. Kattab
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Abstract

In the present work, the problem of frozen orbits of a lunar satellite is treated. The potential of the Moon is considered as oblate body up to zonal harmonics. The most dominant lunar harmonic coefficients of the Lunar potential are taken into account. Firstly, The Hamiltonian of the problem is constructed after assessing the order of magnitudes of the perturbing terms using Delaunay canonical variables. Then, the first normalized Hamiltonian is utilized so as to compute some families of the long-term frozen orbits of some selected orbits in the concerned model using the Lie transform method. To check the validity and the range of applicability of our analytical solution at equilibria, the Hamiltonian canonical equations are solved numerically to obtain a set of frozen orbits. The solution is visualized in the bunch of figures, throughout the manuscript. The behaviour of the inclination versus the eccentricity is investigated for low and medium altitudes lunar orbits. The model reveals some new dynamical features of frozen orbits around the Moon. solutions are obtained for nearly equatorial as well as circular orbits.: Lunar gravity; Zonal harmonic perturbations; Frozen orbits; Frozen eccentricity.

Oral Session 08

Medour Conference Hall

3rd Day, 15.02.2023

Solar System and Solar Terrestrial Physics

Chairman: Thebe Medupe
Co-Chairman: Mohamed Semeida

12:00-12:30	**Solar Systems: Planets, Comets and Asteroids** Zouhair Benkhaldoun
12:30-12:45	**Influence of the surface thermal evolution over organic and inorganic compounds on Iapetus** Katherine Villavicencio
12:45-01:00	**Electromagnetic phenomena and the dynamics of dust particles** Mohamad Abdelaal
01:00-01:15	**Climate Change impact through One Hundred Years of Observations of Ground Solar Radiation in Helwan, Egypt (1914-2015)** U. Ali Rahoma
01:15-01:30	**Geomagnetic signature of two supersubstorms during two magnetic storms** Essam Ghamry
01:30-01:45	**Effect of Solar outcomes on earth magnetosphere** Balveer S Rathore
01:45-02:00	**Climatology of thermospheric neutral temperatures over Oukaïmeden observatory in Morocco.** KAAB Mohamed, Benkhaldoun Zouhair, Makela Jonathan

Solar Systems: Planets, Comets and Asteroids

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Abstract

Thanks to the unprecedented development of observation techniques and the multiplication of space probes, we know our closest space environment, the solar system, better every day. Exoplanetology, which has developed well in recent decades, will also allow us to study from the outside some planetary systems that may resemble ours and will thus help us to better know the genesis of our own solar system. We will review here, the various objects constituting the solar system by making a brief description while drawing up the latest advances and discoveries relating to the Sun itself then to planets, comets, asteroids and beyond.

Session: session 08
Abstract ID: 2

Influence of the surface thermal evolution over organic and inorganic compounds on Iapetus

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Abstract

heIapetus, one of the moons of Saturn, presents an albedo dichotomy characterized by 0.04 and 0.39 respectively, due to exogenous processes and thermal segregation on airless bodies. Spectral data on the visible light, taken by the VIMS instrument on board of the Cassini mission, reveal the existence of two types of materials on the surface, called the dark and light ones. The light side is covered with dark regolith transferred possibly by the dust emitted from Phoebe. The material in the dark side could be an influence of the thermal migration of icy water, generated by the slow rotation of Iapetus around Saturn, allowing for high variations of temperature that ends up in the migration of water. Because of the absence of atmosphere on this moon and the lack of geological activity, the methane detected in the crater floors could emerge from its interior, through lateral landslides margins, giving a hint about a possible presence of ammonia ice. Studying how the evolution of these components might take place, under the physical conditions of Iapetus, could help in understanding the influence of the temperature variations on its surface through time. Here we performed simulations of the surface temperature and the energy budget, and we present an analysis of the diffusion of elements as water ice, methane, and ammonia ice, to figure out if the dynamical interaction among these organic and inorganic components and the radiation balance could contribute to the stabilization and evolution of these material on the surface through time.

Session: session 08
Abstract ID: 76

Electromagnetic phenomena and the dynamics of dust particles

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Abstract

A challenge for both human and robotic planetary exploration missions is the consider-ably different sources of electrical activity on the sur-faces of Mars and the moon. A layer of dust has been redistributed across Mars due to global dust storms. It is predicted that the dust released by these storms and normal dust devils will be electrostatically charged due to the numerous grain collisions in the dust-filled sky. On the other hand, due to the solar wind, cosmic rays, and the photoelectric effect of solar radiation, it is anticipated that dust on the surface of the moon will be electrostatically charged. Electrostatically charged dust has a powerful ability to adhere to surfaces. It has been demonstrated that atmospheric dust falling on the solar panels of NASA's Mars exploration rovers may de-crease their effectiveness to the point where the rover is rendered useless. The Apollo moon missions have demonstrated that lunar dust adhesion can hamper manned and robotic lunar exploration attempts.The Exo-Mars project's (landing platform's) re-search program includes the Dust Complex experiment (DC), which aims to study the dynamics of dust particles and the main parameters of the near-surface environment that influence their dynamics. The DC device includes an ElectroMagenitc Analyzer (EMA), which is designed to register electromagnetic noise signals that can occur in the Martian atmosphere and measure some near-surface environment characteristics associated with dust particle dynamics. The study describes the sensor, its working mechanism, the test results, the characteristics of the measured parameters, and the operating modes.

Session: session 08
Abstract ID: 37

Climate Change impact through One Hundred Years of Observations of Ground Solar Radiation in Helwan, Egypt (1914-2015)

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Abstract

Helwan astronomers participated (1914-1921) in the international program of measuring fluctuations of the Solar Constant under the Abbott vision of Helwan. Some of Helwan's values (1367 Watt/m2) of the Solar Constant coincide with the results obtained by Rockets, Solar Max.Solar physics in Egypt started in 1914 with the measurements of solar radiation at the Helwan Observatory (National Research Institute of Astronomy and Geophysics) and the first solar energy station in Egypt was installed and operated in Helwan in the period from (1957-1961).Under the supervision of Professor Abbott, Helwan astronomers participated in the worldwide software to measure the fluctuations of the solar regular from 1914 to 1921. Some values of Helwan (1367 W/m2) for the solar Radiation are consistent with the results received through Rockets, Solar Max. The Earth Radiation Budget Experiment (ERBE) was challenged in 1980-1992, respectively.In 1964, the sun's regular climate extruded for prolonged periods. The use of PC structures in string assessment timescales for quick and long-term periods of solar activity.Recent measurements of solar radiation have been made in Egypt since (1980-2020). We have an archive of measurements of the several components of solar radiation. As a result, we were engaged in a check on climate extrude that resulted from a century of updates and tendencies that occurred in various aspects of lifestyle and their impact on solar radiation.

Session: session 08
Abstract ID: 85

Geomagnetic signature of two supersubstorms during two magnetic storms

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Abstract

We study two extremely intense substorms ("supersubstorms"/SSSs) during two magnetic storms associated with two consecutive solar wind structures: SHEATH with EJECTA and SHEATH with magnetic cloud (MC). A detailed study is performed of the features of these two SSSs using global geomagnetic field data from the INTERMAGNET network as well as Egyptian geomagnetic station for the first time.

Session: session 08
Abstract ID: 98

Effect of Solar outcomes on earth magnetosphere

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Abstract

Today's challenge for space weather research is to quantitatively predict the dynamics of the magnetosphere from measured solar wind and interplanetary magnetic field (IMF) conditions. Correlative studies between geomagnetic storms (GMSs) and the various interplanetary (IP) field/plasma parameters have been performed to search for the causes of geomagnetic activity, which are important for space weather predictions. In this paper we have found relation between solar activity and geomagnetism during the solar cycle-24. Geomagnetic storms (GMSs) were less during the observed cycle, no severe and great storms had occurred during that cycle.Yearly occurrence of GMSs does not exactly match with phase of solar cycle-24. Similarly occurrences of Coronal mass ejection (CMEs) also do not exactly follow the phase of solar cycle but yearly occurrence of GMSs follow the yearly occurrence of Halo CMEs. Consequently, halo CMEs are responsible for the occurrence of GMSs during the solar cycle-24. The behavior of the total average interplanetary magnetic field (IMF) Btotal, Southward component of IMF (Bz), Solar wind temperature, Solar wind density, Solar wind dynamic pressure, Solar wind velocity (V), and Ey along with geomagnetic storms (Dst index) have been analyzed in this paper. Relation of Dst with Btotal, Bz , Speed V and Ey has been found good during the cycle-24.

Session: session 08
Abstract ID: 106

Climatology of thermospheric neutral temperatures over Oukaïmeden observatory in Morocco.

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Abstract

In this work we present the first multi-year results of the climatology of neutral temperatures measured using an imaging Fabry-Pérot interferometer which provide measurements of the 630.0 nm emissions caused by dissociative recombination of the O2+. These results are obtained during the period from January 2014 to January 2019 including observations from 966 nights. Looking at the results obtained, we find that the temperature is fixed at around 1000 K at the beginning of the night throughout the year, except in the case of the month of August where the temperature was constant and close to 800 K throughout the month. During the winter months the temperature gradually decreases to a temperature of 700 K just before sunrise. While during the summer months a slight increase in temperature is observed, the amplitude of which varies from 50 K to 200 K, the maximum is reached in the vicinity of 22:00 LT, and then continues to decrease until it reaches an almost temperature equal to 800 K at the end of the night. The comparison of these results with the predictions of the MSIS thermospheric model shows that the latter overestimates the value of the temperature during the whole year. We also present some statistical analysis of the “Midnight Temperature Maximum MTM” over the Oukaimeden Observatory.

Oral Session 09

Kobeasy Conference Hall

3rd Day, 15.02.2023

Cosmology and High Energy Astrophysics

Chairman: Jose Miguel
Co-Chairman: Abd El-Fady Beshara Morcos

12:00-12:15	**Two Ionised bubbles at high redshift** Jose Miguel Rodriguez Espinosa
12:15-12:30	**A geometrical interpretation of 21cm foregrounds** Rahul Kothari, Roy Maartens
12:30-12:45	**Cosmological Phase Transitions in an Expanding Universe** Naseer Iqbal
12:45-01:00	**Phase-resolved spectroscopy for >30 Fermi LAT Millisecond Pulsars** Hend Hamed
01:00-01:15	**X-ray spectra study of blazar 501 using Nustar satellite.** Nasser Mohamed Ahmed , Saad Abd Elkader Hassan
01:15-01:30	**On 1+3 covariant perturbations of the quasi-Newtonian space-time in f(G) gravity** Albert Munyeshyaka
01:30-01:45	**Designing a probabilistic model that predicts the existence of future types of civilizations in the universe, and the number of contactable technologically-advanced civilizations, as an alternative to the Drake equation, the Seager equation, and the CETI equation** Nour Al-Deen Nabhan
01:45-02:00	**When dark matter meets dark energy: some cosmological constraints** Remudin Reshid Mekuria, Amare Abebe

Session: session 09
Abstract ID: 28

Two Ionised bubbles at high redshift

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Abstract

We have discovered two ionised bubbles at very high redshifts. One is in the filed of ALBA. The other in the field of the BDF.I will describe the two bubbles and a way of determining the escape fraction of Ionising continuum photons.

Session: session 09
Abstract ID: 49

A geometrical interpretation of 21cm foregrounds

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Abstract

In this exciting era of precision cosmology, cosmological models can be tested against the data. In this regard, the Cosmic Microwave Background (CMB) and the Large Scale Structure (LSS) are significant probes. The LSS data is 3D, potentially containing much more information than CMB. In addition to LSS surveys measuring galaxy number counts, there are surveys that measure integrated line emissions from galaxies. HI, aka 21cm is one such line and is especially intriguing as it comes from neutral hydrogen, the most abundant element in the universe.Although HI mapping is an essential cosmological probe, it suffers from a serious problem of foreground contamination. Extensive work is in progress to model and removes the foregrounds. In addition to these, the method of foreground filtering has also been adopted in the literature. The cleaning is based on filters that avoid certain regions in the Fourier space where it is known that the signal loss due to foregrounds wouldn't be negligible. In the present work, we give a geometrical meaning of foreground cleaning and as an application of the method, we calculate and study the cross-correlation of CMB lensing and HI maps. The lensing of CMB anisotropies contains an imprint of the LSS, projected from the present to the last scattering surface. Thus the combination of CMB lensing with HI can improve precision and break parameter degeneracies.Our method is applicable to both modes of intensity mapping surveys - single dish and interferometer. Our results show that due to the foregrounds, the angular power spectrum has non-diagonal correlations in addition to having many other exciting attributes.

Session: session 09
Abstract ID: 89

Cosmological Phase Transitions in an Expanding Universe

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Abstract

The work compiles a correlated study of a gravitational quasi equilibrium thermodynamic approachfor establishing and signifying a unique behaviour of the cosmological entropy and phase transitionsin an expanding Universe. On the basis of prescribed boundary conditions for the clustertemperature a relation for the intra-cluster medium (ICM) of galaxy clusters has been derived. Amore productive and signifying approach of the correlation functions used for galaxy clusteringphenomena shows a unique behaviour of the entropy change where a phenomenon known as thegravitational phase transition occurs. This unique behaviour occurs with a symmetry breaking frommild clustering to low clustering and from mild clustering to high clustering which differs from anormal symmetry breaking in material sciences. We also derive results for the specific latent heatassociated with the phase transitions of 3.20 Tc and 0.55 Tc for the mildly clustered phase to the lowclustered phase and from the mildly clustered phase to the highly clustered phase, respectively.

Session: session 09
Abstract ID: 51

Phase-resolved spectroscopy for >30 Fermi LAT Millisecond Pulsars

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Abstract

Millisecond pulsars (MSPs) share some characteristics with young pulsars, but have others that are different; this makes them interesting targets to study. MSPs are old, recycled pulsars with a rotation period of less than 30 ms and a low surface magnetic field. The Third Fermi Large Area Telescope (LAT) Pulsar Catalogue (3PC) will present light curves and spectral data for more than 250 gamma-ray pulsars, with more than 120 of them being MSPs. Phase-resolved spectroscopy has been performed for only a few MSPs in the past. In this project, we are updating this analysis, considering more MSPs and taking advantage of a larger dataset, given the 14 years of operation of Fermi Large Area Telescope (LAT). We hope to confirm a preliminary trend between the luminosity or integral energy flux and the so-called apex energy (the energy at which the spectral energy density or SED peaks), analogous to the blazar sequence; and probe the low-energy SED slope vs. integral energy flux for different peaks (fixed phase ranges) in the pulsar gamma-ray profile.

Session: session 09
Abstract ID: 101

X-ray spectra study of blazar 501 using Nustar satellite.

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Abstract

We present a detailed spectral study of NuSTAR observations of the blazar (Mrk 501). The X-ray properties of our object are derived by extracting the Blazar spectra and light curve, and fitted by some spectral models. Some of these models give similar results. By comparing the fits from the different models, we find the best spectra model to fit the represent the data. To test the X-ray variability of our Blazar sample, we fit their spectra extracted from the same instrument with the same procedure by the same model to estimate their X-ray flux and luminosity. The estimated fluxes are compared to check their variability.

Session: session 09
Abstract ID: 52

On 1+3 covariant perturbations of the quasi-Newtonian space-time in f(G) gravity

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Abstract

The consideration of a 1+3 covariant approach to cold dark matter universe with no shear cosmological dust model with irrotational flows is developed in the context of f(G) gravity theory in the present paper. This approach reveals the existence of integrability conditions which do not appear in non covariant treatments. We derive the integrability conditions from constraint equations based on showing that the quasi-Newtonian models represent a subclass of linearised silent models in f(G) gravity. Finally, we derive the the evolution equations for the matter density and velocity perturbations of the quasi-Newtonian universe. We apply the harmonic decomposition and redshift transformation technique to explore the behaviour of the matter and velocity perturbations using f(G) model.We introduce the quasi-static approximation to study the approximated solutions on small scales which help us to get both analytical and numerical results of the perturbation equations.We depict that matter energy density perturbations decay with redshift and Quasi-static approximation is not applicable to the velocity perturbations for large values of m.

Session: session 09
Abstract ID: 9

Designing a probabilistic model that predicts the existence of future types of civilizations in the universe, and the number of contactable technologically-advanced civilizations, as an alternative to the Drake equation, the Seager equation, and the CETI equation

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Abstract

The questions of whether humanity is the only life form in the universe, and whether human civilization is the only civilization in the universe, have puzzled astronomers, biologists, and thinkers in many other fields, the curiosity around those questions has not decreased with time, as a matter of fact it has increased, and thus the purpose of this paper is to try to answer the two questions by depending on conditional probabilistic modeling after organizing levels of development which are seen as the most significant stages of the development of a civilization from a simple life form depending on their biological and technological advancements and then, in a nearly similar fashion, try to find the number contactable civilizations based on their technological developments in radio communication and intergalactic and/or interstellar travel, all while giving perspective on life and civilization in the universe by treating their probabilities as functions of the age of the universe.

Session: session 09
Abstract ID: 74

When dark matter meets dark energy: some cosmological constraints

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Abstract

Some cosmological models with interacting dark matter and dark energy will be presented. We will show how such interacting dark-fluid models can potentially alleviate the so-called coincidence and Hubble-tension problems. And finally, we will demonstrate first attempts to constrain such models using observational and simulated astronomical data.

Oral Session 10

Main Conference Hall

3rd Day, 15.02.2023

Instrumentation and site testing

Chairman: David Buckley
Co-Chairman: Yosry Azzam

03:15-03:30	**Towards an African Integrated Observation System** David Buckley
03:30-03:45	**Towards the Construction of the Egyptian Large Optical Telescope (ELOT)** Yosry A. Azzam , Ali Takey , Sayed A. Mekhaimer , Ashraf Shaker , Hadia Selim , Gad El-Qady
03:45-04:00	**The scientific impact of the telescopes at the Rozhen observatory** Evgeni Semkov
04:00-04:15	**DESIGN AND DEVELOPMENT OF FOUR ELEMENT INTERFEROMETER OF 2.4-METER PARABOLIC ANTENNA AT THE MAURITIUS RADIO OBSERVATORY FOR GALACTIC HYDROGEN EMISSION (HI) STUDIES** Albert Forson, Paul Akumu, Heeralall-Issur, Avadesh . A. Deshpande, Peter Wilkinson, Kumar Golap, Sunam Yashwantsing
04:15-04:30	**Site Selection of Egypt Large Optical Telescope (ELOT) based on Environmental Criteria** Sayed Mekhaimar, Ali Takey, Mohamed F. Aboushelib
04:30-04:45	**Identification of Potential Astronomical Sites in Ethiopia** Nebiyu Suleyman Mohammed, Solomon Belay Tessema
04:45-05:00	**Doing astronomy on top of Africa** Noorali Jiwaji, Said Ally, Emmanuel Kigadye, Gordon MacLeod, Sheperd Doeleman, Nimesh Patel
05:00-05:15	**Design of a High Time-Frequency Resolution Receiver and Data Processing Pipeline for Transient Detection at L-band** Paul Akumu
05:15-05:30	**Seismic hazard assessment for a list of candidate new ground based telescope sites in Egypt** Hazem Badreldin, Hany M. Hassan, Mohamed S. Darwish

Session: session 10
Abstract ID: 65

Towards an African Integrated Observation System

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Abstract

This talk will review the concept and plans for an integrated network of telescopes in Africa: the African Integrated Observation System (AIOS). This project leverages a parallel BRICS Flagship program, which aims to network current and future observing facilities within member countries. AIOS will build on the common aspirations for scientific and technological advancement through collaboration and enhancing human capital development and wider benefits to our societies. The AIOS will leverage existing and future facilities within Africa to enable coordinated and automated observations supporting the big astronomy survey missions of the future, particularly the Rubin Observatory LSST and SKA-1 facilities.

Session: session 10
Abstract ID: 91

Towards the Construction of the Egyptian Large Optical Telescope (ELOT)

Yosry A. Azzam , Ali Takey , Sayed A. Mekhaimer , Ashraf Shaker , Hadia Selim , Gad El-Qady
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Abstract

A lot of scientific research work has been implemented using the 30” Reynolds refractor at Helwan since 1907, and the Kottamia 1.88-m telescope since 1964. The Kottamia telescope is the only one at its size in the Middle East and the second in Africa. As a result of constructing the new Egyptian administrative capital very near to the Kottamia observatory, the observatory will no longer be suitable for astronomical observations. The government took a decision and agreed to build a new larger telescope in a new site. This new telescope is expected to have a 6.5-m aperture.Although modern large ground-based telescopes are complex and requires expensive pieces of research equipment, a crucial part of their design and effectiveness are affected by their location. Future Egyptian Large Optical Telescope (ELOT) is expected to help astronomical community in Egypt and worldwide to fill the observational gab between Europe in the north and South Africa in the south and between Asia at the east and Chile at the west. To maximize the importance of this telescope, a lot of work must be done to match between ELOT optical design, its attached astronomical instruments and site optical characteristics to fill in this gab.As a first step, two sites have been selected which are very good candidates for astronomical sites based on some specific physical and meteorological parameters using satellite and/or ground based data. The prevailing meteorological conditions over Egypt as a whole, and particularly over these two sites have been investigated. The second step is to characterize these two candidate sites using some specific instruments that will be installed on those sites. However, there are some logistic challenges and difficulties facing the instalment of these instruments which will permit going on to the next step. In this research we will introduce the recent updates in the site selection and testing process along with the difficulties and challenges facing the process towards building and constructing of the new observatory which will make the ELOT a reality.

Session: session 10
Abstract ID: 3

The scientific impact of the telescopes at the Rozhen observatory

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Abstract

Bulgarian National Astronomical Observatory Rozhen is located in the Rhodope Mountains at about 1750 m above sea level. The astronomical observatory is the biggest one-time Bulgarian investment in scientific infrastructure and a leading astronomical center in the South-East Europe. So far, the observatory has four telescopes: 2-m RCC multipurpose telescope equipped with four new professional CCD cameras, coudé and éshelle spectrographs, 50/70 cm Schmidt telescope, 60 cm Cassegrain telescope and 15 cm Lyot-coronagraph.The scientific topics developed at the observatory are grouped into three departments: Sun and Solar System, Stars and Stellar Systems, Galaxies and Cosmology. The main objects for observation are: small bodies from the Solar system, various types of variable stars, blazars and active galactic nuclei. Scientific results obtained with the observatory's telescopes are published in astronomical journals with a high impact factor. For the last 5 years, a total of 82 articles have been published in the following journals: Nature – 2, Science – 1, Nature Com. – 1, MNRAS – 31, A&A – 23, ApJ -9, AJ – 7, Icarus – 5 and PASA – 3.In order to expand the capability for astronomical observations and to increase the efficiency of the Observatory, in 2020 a contract was signed with the company ASA Astrosysteme GmbH for the supply and installation of a new 1.5 m telescope in NAO Rozhen. The telescope will be installed in a new dome with a diameter of 6 m and a height of 8 m and will be fully robotic. The telescope will initially work only in photometric mode, but in the future the delivery of a low-dispersion spectrograph is also planned.

Session: session 10
Abstract ID: 77

DESIGN AND DEVELOPMENT OF FOUR ELEMENT INTERFEROMETER OF 2.4-METER PARABOLIC ANTENNA AT THE MAURITIUS RADIO OBSERVATORY FOR GALACTIC HYDROGEN EMISSION (HI) STUDIES

Albert Forson[1], Paul Akumu[1], Heeralall-Issur[1], Avadesh . A. Deshpande[2], Peter Wilkinson[3], Kumar Golap[4], Sunam Yashwantsing[1]

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Abstract

The largest radio interferometer is under construction in South Africa. Some of its scientific goals are to improve the study of the atomic HI in the cosmos. The construction is slated to occur in 2 phases SKA1 and SKA2. As part of SKA2, outlier stations are scheduled to be constructed in African partner countries: Ghana, Kenya, Zambia, Namibia, Botswana, Madagascar, Mozambique and Mauritius.In order to develop relevant capacity building in Mauritius to respond to SKA-2 technical and engineering system verification challenges, four redundant 2.4-meters offset satellite parabolic dishes from the Mauritius Telecom were converted into radio telescopes for an array of small parabolic dish antennas. The project should also help to increase institutional capacity and skill levels across the African continent for a better readiness to achieve the objectives of the African Very Long Baseline Interferometry (VLBI) Network (AVN).In completion, the instrument is aimed to study galactic neutral hydrogen (HI), in particular its spatial distribution on large scales, closure phase measurement and also have transient search capabilities.Key words: Square Kilometer Array (SKA), Interferometer, Neutral Hydrogen (HI) and Closure Phase.

Session: session 10
Abstract ID: 99

Site Selection of Egypt Large Optical Telescope (ELOT) based on Environmental Criteria

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Abstract

Egypt has a few mountains with suitable elevations and topography for the Large Telescope site. In order to specify which of them has the optimum conditions for astronomical seeing, we investigate the prevailing meteorological conditions over Egypt as a whole, particularly over these mountains, by using all available climatic data for the longest available records. Since there are no ground-based observations in most mountain regions, the current work uses the ECMWF-ERA-5 reanalysis data. This dataset covers 40 years of atmospheric reanalysis (1981-2020) with hourly temporal resolution and 10 km spatial resolution for land/surface parameters and about 30 km for upper-air parameters. Based on a multi-criteria approach, the number of missing nights are estimated for each mountain. In addition, the impact of light pollution on the sites is investigated. Since this telescope is expected to work for an extended period, the change in climate conditions should be considered as a factor of site selection. Therefore, the climate change for the most promising mountainous sites is analysed using the coordinated regional climate downscaling experiment (CORDEX) projected data set for 100 years.

Session: session 10
Abstract ID: 27

Identification of Potential Astronomical Sites in Ethiopia

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Abstract

In the coming years, Ethiopia may find the need to build new astronomical observatories to continue local programs and contribute to global survey projects. However, the observing quality of medium and large telescopes in these observatories at optical, infrared, and radio wavelengths is primarily determined by atmospheric transparency. In turn, atmospheric transparency depends on the metrological and topographic conditions. Because of these factors and the high costs of large telescopes and their implementations, it is very crucial for Ethiopia to choose sites that are the best possible places for astronomical observations. Fortunately, the country has many candidate sites with high plateau regions and mostly dry climates located near the equator. This paper identifies the best possible candidates for astronomical observational sites in Ethiopia using Multi-Criteria Decision Analysis integrated with Geographical Information Systems and remote sensing technologies. We rank mountains (with altitudes greater than 2,500m above sea level) according to their metrological parameter values. Then we will end up with favorable sites after eliminating those that don't fulfill the criteria set and then determine, at least in first approximation, 'good' astronomical site locations in the nation. The selection is based on the general principles that a good observatory site has a high elevation, little light pollution, higher available clear nights, dry weather (low precipitation), calmer wind and low temperature fluctuations. Statistically, it will be shown that the optimum sites are mainly found in the highlands of the Northern and Eastern parts of Ethiopia. We found out that the best sites within the country for building astronomical observatories are likely to be on the highest mountains found in the Northern part of Ethiopia.

Session: session 10
Abstract ID: 55

Doing astronomy on top of Africa

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Abstract

Tanzania has struggled for several decades to establish Astronomy in the country through many efforts in outreach, education, training, and research. Even with numerous such efforts, it has not been possible to formalize this as a specific discipline at University level and to institutionalise it at national level. With recent developments after many years of follow up, the area of radio astronomy using very long baseline interferometry has been able to attract attention of the Next Generation Event Horizon Telescope collaboration for using the Saddle area of the highest mountain in Africa, the Kilimanjaro Mountain. In addition to the scientific and technological benefits that this initiative can accrue for the country, the more immediate economic benefits of Astrotourism has also been an attraction to give more attention to Astronomy, especially in terms of institutionalisation of Astronomy in Tanzania.We describe our efforts of the more than decade that have led to acceptance of conducting a preliminary site testing study to determine suitability of the Saddle area of the Kilimanjaro Mountain to be sufficiently “high and dry” for millimeter radioastronomy. Together with its unique location as an easternmost site for monitoring dynamic processes in black holes, it is necessary to prove that the water vapour pressure (wvp) profile above the is sufficiently low. Satellite data show that the wvp is indeed sufficiently, and especially since weather will tend to flow around the mountain since Kilimanjaro is the highest free standing mountain in the world, a real time site testing is now in preparation using a custom built radiomter to measure wvp as well an all sky camera that will monitor the cloud cover over at least a one year period at the Kibo Huts site at 4,700 meters level. The equipment has been delivered and is being tested at the University before installation at the Kilimanjaro site. Meteorological data will also be collected to get an overall understanding of the weather.The Kilimanjaro Mountain, as a UNESCO World Heritage site, close attention will be paid that any installations will not disturb its beauty and its environment of all ecological zones. Close attention will also be paid to respecting the cultural practices of the local people inhabiting on the mountain and involving them in the benefits of Astronomy.

Session: session 10
Abstract ID: 78

Design of a High Time-Frequency Resolution Receiver and Data Processing Pipeline for Transient Detection at L-band

Paul Akumu
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Abstract

My research project is on the design of a high time frequency resolution receiver and data processing pipeline for transient detection at L-band. This is part of a wider project to set up an array of four 2.4-meter parabolic small parabolic antennas at the Mauritius radio telescope site. I have implemented a wideband receiver signal chain with a bandwidth of up to 120MHz with a complementary FPGA-based backend for digital signal processing including associated software. We are currently testing and tuning the array systems for observations.

Session: session 10
Abstract ID: 108

Seismic hazard assessment for a list of candidate new ground based telescope sites in Egypt

Hazem Badreldin, Hany M. Hassan, Mohamed S. Darwish
National Research Institute of Astronomy and Geophysics (NRIAG), EGYPT
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Abstract

Seven sites have been nominated for a detailed multi-parameters site selection of an astronomical observatory in which multidisciplinary information is combined. Three sites (1, 2, and 3) are located in south Sinai governorate, while the other four are located northwest of the Red sea (west of Hurghada), where all of them are located in mountain areas. These sites are situated in region defined by many as relatively high seismic hazard (north Red Sea and gulfs of Suez and Aqaba). The seismic input was computed using physics-based ground motion approach to assess the seismic hazards and consequently the designation of seismic resistant structure for the proposed sites to be able to assess the seismic hazards for the candidate sites. We perform a parametric test for all possible earthquake scenarios (i.e. magnitude, position, depth, strike, dip and rake) using a one-dimensional regional bedrock model to define the parameters that could produce strong impacts for the seven sites. Synthetic seismograms and maximum credible seismic input (PGD, PGV, PGA, DGA and spectral response) at bed rock from any expected large earthquake that could effect on the sites are estimated. Crustal model for the study area is then used to model the wave propagation between the source and the site, earthquake catalogues for both historical and instrumental, fault plane solutions that represent each seismic source as well as seismogenic zones are used to model the expected synthetic seismograms. Engineering analysis, indicate a relatively high seismic hazard at sites 1, 2 and 5 while sites 3 and 4 undergoes low hazard.

Main Conference Hall

4th Day, 16.02.2023
Time: 9:00-9:30

International Celestial Reference Frame (ICRF): Connecting Astrometry and Astrophysics

Zinovy Malkin
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Abstract

Establishment and maintenance of celestial reference coordinate system is a key problem of fundamental astrometry. Its current version, adopted by the International Astronomical Union (IAU) since January 1, 1998, is the International Celestial Reference System (ICRS). ICRS is realized by catalog of positions of extragalactic radio sources, International Celestial Reference Frame (ICRF), obtained from VLBI observations. The first ICRF catalog was created in 1995. Since then, the second (2009) and third (2018) ICRF catalogs were created and approved by the IAU. The precision of ICRF has increased by more than an order of magnitude from the first to the third version. The VLBI-based source positions now have a precision of the order of 0.1 mas. At this level of precision, a complex and variable radio source (mostly AGN) structure has become a key factor determining the ICRF accuracy, which requires investigation of astrophysical processes in radio sources observed for astrometry. In this presentation, the history, the current state, and prospects of ICRF will be discussed.

Poster Sessions

Poster Session

Main Conference Hall

1st Day, 13.02.2023

Screen1 :Galaxies and Extra-galaxies

Chairman: Ashraf Tadross

03:20-03:30	**Classical or Psuedo: Bulges of Galaxies** Priya Shah
03:30-03:40	**Applications of Fractional Calculus in Stellar Astrophysics** Mohamed Nouh
03:40-03:50	**SALT-NIR IFU: Bringing IFU and Near-IR capability to SALT** Moses Mogotsi
03:50-04:00	**New CCD Photometry of 1SWASP J193127.17+465809.1: Classifying SX Phoenix Variabl** Abdel-Sabour, M, Zeed, A, Shokry, A, and Somaia S.
04:00-04:10	**Observing and studying astronomical transient phenomena using the Kottamia Astronomical Telescope** Ali Takey
04:10-04:20	**The first griz CCD photometric studies of the new W UMa eclipsing binary ZTFJ015003.88+534734.1 in the new discovery open cluster UBC 188** Yasser Hendy

Chairman: Mohamed Nouh

04:20-04:30	**Spectroscopic analysis of Galactic O type Stars** Ahmed Shokry Abouelfoetouh Elshaer , Mohamed Ibrahim Nouh , Diaa Douda
04:30-04:40	**Spectroscopic and Photometric Analysis of the pre-Cataclysmic Variable UX CVn** Mohamed Abdel-Sabour , Mohamed I. Nouh , Ahmed Shokry , Gamal M. Hamed
04:40-04:50	**First multi-band CCD photometric study for the eclipsing binary KAO-EGYPT J214216.38+440015.1** M. A. El-Sadek
04:50-05:00	**Climate Change and its impact on astronomical observations: KAO case study** Mohamed S. Darwish1, Mostafa A. Morsy2, Somaya S. Mohamed1
05:00-05:10	**Analysis of Commensurate Semimajor Axes of Resonant Orbits Including Second Order Gravitational Perturbations** Zeinab Ahmed Mabrouk, Fawzy Ahmed Abd El-Salam, Wesam Mohamed El-mahy, Ashraf Hamdy Owis
05:10-05:20	**X rays analysis in AGN** Siham Kalli , Aicha Mohadi

Session: Screen 01
Abstract ID: 19

Classical or Psuedo: Bulges of Galaxies

Priya Shah
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Abstract

In this paper, we shall discuss a method using bulge types to study virialised clusters of galaxies with no-interaction features, like tails and bridges, using diagnostics of bulge classification and their properties, namely S\'ersic index (n) and the Kormendy relation}. We shall discuss the results of our study of a sample of galaxies in the core of the Coma Cluster using HST/ACS data.

Session: screen 01
Abstract ID: 12

Applications of Fractional Calculus in Stellar Astrophysics

Mohamed Nouh
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Abstract

Fractional calculus has been significantly promoted in many physics and astronomy disciplines in the last ten years. The present article reviews the computational efforts that apply fractional calculus to various problems of stellar structure and nucleosynthesis. In the current review, we are concerned about the fractional polytropic and isothermal gas spheres and the fractional stellar helium burning network. We employed the conformable and Riemann–Liouville definitions to determine the stellar physical parameters. We discuss how fractional parameters affect physical variables such as densities, pressures, and masses. We next compared the two fractional models and deduced possible applications to stellar models and evolution calculations.

Session: screen 01
Abstract ID: 54

SALT-NIR IFU: Bringing IFU and Near-IR capability to SALT

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Abstract

The Southern African Large Telescope is adding a new instrument that will extend its observational range into the near-infrared and it will be the first integral field unit at the telescope. The instrument consists of 248 fibres arranged into a 29 x 18 arcsec field of view science bundle and a smaller sky bundle, offering simultaneous sky and science observations. It will cover 800nm -1700nm at resolutions ranging from R=2000 to 5000. Its 1.3 arcsec diameter fibres are well matched to the seeing on-site and the size and shape of the array will be ideal to study nearby galaxies, thereby complementing exisiting optical surveys of nearby galaxies. This new capability will also be useful for transient, stellar and other galactic science. I will present information on this new instrument, its development and commissioning.

Session: Screen 01
Abstract ID: 64

New CCD Photometry of 1SWASP J193127.17+465809.1: Classifying SX Phoenix Variabl

Abdel-Sabour, M, Zeed, A, Shokry, A, and Somaia S.
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Presenter : Abdel-Sabour

Abstract

CCD photometric observations with BVRI filters on 2016 and 2017, 2021, and 2022 by using the 1.88 m telescope of Kottamia Astronomical Observatory (KAO) (Egypt) revealed that the star 1SWASP J193127.17+465809.1 is low-amplitude (Δm < 0.3 mag) Eclipsing Binary with δ Scuti star. The peak-to-peak amplitudes is 0.0478 mag(V), one mode present (f1 =10.1184414±0.0027 c/d). The frequency suggests that the star is non-radial pulsator. The global physical parameters of the variable 1SWASP J193127.17+465809.1; Period change(1/P)dP/dt, Radius ,bolometric magnitude, stellar mass, log g , The pulsation constant(Q) , and stellar distance are be determined. The possibility of a third body being present in this system. our observations clearly show that 1SWASP J193127.17 +465809.1 is not an EB, as reported by Qian S.-B. et al (2017). By using the empirical relations for 1SWASP J193127.17+465809.1, we determined the global physical parameters. Also Stellar parameters of our system in the instability strip of the Hertzsprung Russell diagram and stellar evolution are presented.

Session: screen 01
Abstract ID: 24

Observing and studying astronomical transient phenomena using the Kottamia Astronomical Telescope

Ali Takey
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Abstract

We present the current status of an ongoing project aiming to conduct observational studies in the field of Time-Domain Astronomy (TDA) that deals with the brightness changes of astronomical objects with time. This kind of research focuses on studying the transient astronomical events that happen on short cosmic time scales ranging from hours or days to a year. These transient phenomena include the optical emission from supernovae (SNe), gamma-ray bursts (GRBs), active-galactic nuclei (AGNs), and binary stars (BSs). There are ongoing astronomical surveys by many international groups to discover these phenomena. We are observing samples of newly discovered SNe, GRBs, AGNs, and BSs using the 1.88-meter telescope at the Kottamia Astronomical Observatory (KAO) in Egypt. The following-up observations and monitoring such astronomical objects contribute to better understanding of their physics and origin. This kind of research will enable the Egyptian astronomers to participate in a few of recent international projects.

Session: screen 01
Abstract ID: 88

The first griz CCD photometric studies of the new W UMa eclipsing binary ZTFJ015003.88+534734.1 in the new discovery open cluster UBC 188

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Abstract

The first griz CCD photometric studies of the new W UMa eclipsing binary ZTFJ015003.88+534734.1 in the new discovery open cluster UBC 188Y. H. M. Hendy, I. Zead, A. E. Abdelaziz, A. TakeyAstronomy Department, National Research Institute of Astronomy and Geophysics (NRIAG), 11421 Helwan, Cairo, Egypt.We present a photometric and astrometric analysis of the UBC 188 cluster using Gaia DR3 data. The fundamental parameters (age, color excess, intrinsic distance modulus, and distance) are calculated. The photometric analysis and light curve modeling of the proposed eclipsing binary member ZTFJ015003.88+534734.1 are performed using the latest version of the Wilson-Devinney (W-D) code. The solutions show that the system is an over-contact binary with a secondary component filling its Roche lobe. We find that ZTFJ015003.88+534734.1 is a member of UBC 188.

Session: screen 01
Abstract ID: 16

Spectroscopic analysis of Galactic O type Stars

Ahmed Shokry Abouelfoetouh Elshaer , Mohamed Ibrahim Nouh , Diaa Douda
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Abstract

In the present paper, we investigate the fundamental parameters (e.g. Teff, log g, and V sin I) of a sample of O-type stars. Using optical spectra collected for each object in our samples from the NOAO Indo-U.S. Library, and ELODIE archive, we apply the non-LTE TLUSTY and CMFGEN model atmospheres codes to determine their fundamental properties. Approximate masses for the studied stars are obtained by comparing the resulting effective temperatures and surface gravities with the evolutionary tracks.: O-type stars, TLUSTY, CMFGEN, and Model atmospheres.

Session: screen 01
Abstract ID: 26

Spectroscopic and Photometric Analysis of the pre-Cataclysmic Variable UX CVn

Mohamed Abdel-Sabour , Mohamed I. Nouh , Ahmed Shokry , Gamal M. Hamed
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Abstract

The pre-cataclysmic variables with B-type sub-dwarfs remained understudied at the beginning of the twenty-first century due to the technological difficulties of their discovery and subsequent investigation. Today, with the advancement of identification techniques, their number has quickly risen, and there are already around 40 known systems. One of the intriguing pre-cataclysmic variables that are said to need additional research is the star UX CVn (Shimanskiy et al., 2002). In order to ascertain UX CVn's fundamental parameters and evolutionary stage, we conducted a spectroscopic and photometric study of the sample. We gathered the available spectroscopic and photometric data in addition to Kottamia Astronomical Observatory (KAO) observations to model the light curves and spectra and establish trustworthy physical characteristics for the system. The effective temperature and surface gravity were calculated using synthetic modeling of a few line profiles from low-resolution spectra taken at various phases of the star have given the values T_eff = 29000+/- 250 K and log_g 4.0+/- 0.2 dex.

Session: screen 01
Abstract ID: 69

First multi-band CCD photometric study for the eclipsing binary KAO-EGYPT J214216.38+440015.1

M. A. El-Sadek
National Research Institute of Astronomy and Geophysics (NRIAG), EGYPT
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Abstract

We present new BVRI light curves of eclipsing binary system , KAO-EGYPT J214216.38+440015.1 , which have been constructed based on CCD observations obtained by using the 1.88-m telescope of Kottamia observatory by using Newtonian and Cassegrain telescope Focus's. The modeling results show that the system are semi-detached eclipsing binary. In some of light curves we show the inverse O'Connell effect. By using our new times of minima and epoch for the system from all available observations , for KAO-EGYPT J214216.38+440015.1 , the orbital period is here revised. By using the PHOEBE package , a preliminary determination of the photometric orbital and physical parameters of the system has been present . Although the orbital duration seems to be steady on the lengthy term of KAO-EGYPT J214216.38+440015.1 , we exhibit that the light-curve form is affected through a years-long modulation which is most likely due to the magnetic endeavor of the cool companion . The eclipsing binary structures KAO-EGYPT J214216.38+440015.1 are the semi-detached type who secondary element fill its Roche lobe . Although radial pace and mild curves of these structures have already been investigated separately, each radial pace and mild curves of them are analyzed concurrently for the first time in the present study. Also , the orbital period changes of these structures are studied. Our outcomes exhibit that the mass switch between factors have negligible results on the orbital period changes of these systems , however two light-time consequences are the motives of the periodic conduct of the O-C curve for KAO-EGYPT J214216.38+440015.1. In some light curves we shows the inverse O'Connell effect. Although the orbital duration seems to be steady on the lengthy term of KAO-EGYPT J214216.38+440015.1 , we exhibit that the light-curve form is affected through a years-long modulation which is most likely due to the magnetic endeavor of the cool companion .

Session: screen 01
Abstract ID: 23

Climate Change and its impact on astronomical observations: KAO case study

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Abstract

A fundamental parameter for characterizing the quality of astronomical observations above astronomical sites is the atmospheric conditions. The present work aims to trace the trend of the meteorological conditions (e.g., Relative humidity (RH), Wind Speed (WS), Wind Direction (WD), Air Temperature (AT), Cloud Coverage (CC) and Total column Water Vapor (TCWV)) above the site of Kottamia Astronomical Observatory (KAO). The data for the current study is collected from the Fifth generation atmospheric reanalysis (ERA5) of the European centre for median-rang weather forecasts during the available data from the previous years. In addition, future climate influence is also stimulated. The ground layer-turbulence as well as the number of photometric nights is measured. Eventually, more data from different resources including in-situ data are recommended and necessary to follow up on the changes in climate conditions above KAO.

Session: screen 01
Abstract ID: 105

Analysis of Commensurate Semimajor Axes of Resonant Orbits Including Second Order Gravitational Perturbations

Zeinab Ahmed Mabrouk, Fawzy Ahmed Abd El-Salam, Wesam Mohamed El-mahy, Ashraf Hamdy Owis

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Abstract

In this work, the effects of perturbations due to resonant geopotential harmonics on thecommensurate semi-major axis of Low Earth Orbit of an artificial satellites are studiedand are analyzed. The secular variations in the included orbital elements up to the sixthEarth's zonal harmonic are considered. In the resonance case a certain number of tesseralharmonics can produce effects of large amplitude and very long period, these importanttesseral harmonics can be computed via Kuala's resonant perturbation theory, Kaula(1966). The resultant commensurate semimaiour axiesof the resonant orbits are expressed in terms of the k:lratio, where k:l represents the ratio of the orbital revolutions to the terrestrial revolutions. A second order approximation of thecommensurate semi-major axisdue to the higher order perturbations will be obtainediteratively.

Session: Screen 01
Abstract ID: 22

X rays analysis in AGN

Siham Kalli , Aicha Mohadi
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Abstract

We analyze XMM-Newton observations of some AGN (Seyfert 1 galaxies) in order to study timing and spectral variability. We study the time delays between direct X rays emission from the accretion disk and the reflected emission, in order to study the Lamp-post and Wind reverberation models.

Poster Session

Main Conference Hall

1st Day, 13.02.2023

Screen2: Cosmology and High energy Astrophysics

Chairman: Ahmed Ghitas

03:20-03:30	**Quantum superradiant entanglement of a bipartite system in Schwarzschild space-time** mohamed Abdelouahab, Mounir BOUSSAHEL
03:30-03:40	**STABILITY ANALYSIS OF RELATIVISTIC ISOTHERMAL GAS SPHERE** Tarek M. Kamel, Mohamed I. Nouh, Abdel-Naby S. Saad
03:40-03:50	**X rays properties in Seyfert galaxies** Siham Kalli, Aicha Mohadi
03:50-04:00	**The curve light of GRB afterglows using a new Hydrodynamic modal for a Power-law Distribution** Esma ZOUAOUI, Noureddine MEBARKI

Session: screen 02
Abstract ID: 75

Quantum superradiant entanglement of a bipartite system in Schwarzschild space-time

mohamed Abdelouahab, Mounir BOUSSAHEL
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Abstract

In this work, our main goal was to extend quantum entanglement to superradiance. For this, it was necessary to identify the common point between the two physical concepts. This is what has been proposed and achieved, thanks to the common properties carried by the wave function solution of the Klein Gordon equation which defines the bipartite system at spin ½ in a Schwarzschild space time. A detailed study was completed where it was found that superradiance extended to quantum entanglement is more robust so far it is from the black hole.

Session: screen 02
Abstract ID: 48

STABILITY ANALYSIS OF RELATIVISTIC ISOTHERMAL GAS SPHERE

Tarek M. Kamel[1] , Mohamed I. Nouh[1] , Abdel-Naby S. Saad[2&1]
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Abstract

In this paper, we study the relativistic self-gravitating, hydrostatic spheres with isothermal polytropic equation of state, and illustrate the results for different relativistic parameters. We determine the critical relativistic parameter at which the mass of the polytrope has a maximum value and represents the first mode of radial instability. The results of critical values are in full agreement with those evaluated by several authors. Comparisons between analytical and numerical solutions of the given relativistic functions provide a maximum relative error of order 10-3.

Session: screen 02
Abstract ID: 79

X rays properties in Seyfert galaxies

Siham Kalli, Aicha Mohadi
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Abstract

We analyze XMM-Newton observations of some Seyfert 1 galaxies in order to study timing and spectral variability. We study the time delays between direct X rays emission from the accretion disk and the reflected emission, in order to study the Lamp-post and Wind reverberation models.

Session: screen 02
Abstract ID: 90

The curve light of GRB afterglows using a new Hydrodynamic modal for a Power-law Distribution

Esma ZOUAOUI, Noureddine MEBARKI
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Abstract

The afterglows are remnant, softer and delayed radiations from the gamma ray bursts who consist over a large frequency range extending from X-rays down to radio waves. In this paper we proposed a new expression of the radiation energy which is leading to a new model compatible with Sedov solution [1], for the explanation and the modeling the dynamics of the afterglows

Poster Session

VIP Room

1st Day, 13.02.2023

Screen 3: Solar Physics and Space Weather

Chairman: Usama Rahoma

03:20-03:30	**Influence of solar activity on earthquakes during solar cycle 25.** M. A. Semeida, Shahinaz Yousef, Yasmeen Saeed
03:30-03:40	**Solar energetic particles as space weather drivers in the near Earth environment: A new Egyptian-Bulgarian Project** Susan Wassem Samwel1, Rositsa Miteva2, Makram Ibrahim1, Mohamed Darwish1, A. Abulfwa, Kamen Kozarev, Mohamed Nedal, Nikola Petrov
03:40-03:50	**Solar Energetic Particles on the Terrestrial Environment, trends, prediction and alerts** Magda Moheb, Ahmed Abulwfa, Sara Said
03:50-04:00	**Nord Sea 1and Nord Sea 2 Gas Leaks in Response to Start of Aurora and Magnetic Storms on 26 of September 2022 and the Corresponding Induced Telleric Current** M. A. Semeida, Shahinaze Yousef
04:00-04:10	**PV systems feeding satellites and their impacts by solar Energetic Particles in LEO** Magda Moheb, Ahmed Abulwfa , Sara Said

Chairman: Yousry Hanna

04:10-04:20	**Impact of solar energetic particles events on ultraviolet radiation** Ahmed Abulwfa , Magda Moheb, Sara Said
04:20-04:30	**Disappearance of Egyptsat-1** mohamed ghareeb , R. H. Hamid
04:30-04:40	**DFT and QSAR Studies of PTFE/ZnO/SiO, Nanocomposite** Hend Ezzat
04:40-04:50	**Statistical analysis of geomagnetic storm according to solar activity during the last two solar cycles** Eid Amin
04:50-05:00	**Studying the optical and thermal properties of Cs/ZnO and Cs/ ZnO/GO hybrid nanocomposites** Hend Ezzat

Session: screen 03
Abstract ID: 42

Influence of solar activity on earthquakes during solar cycle 25.

M. A. Semeida[1], Shahinaz Yousef[2], Yasmeen Saeed[2]
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Abstract

Most of studies about the relation between solar activity and earthquakes have the cycles about 11 and 22 years like as solar activity cycles.The solar cycle 25 seems to be of great interest for the researchers due to peculiarities.In this work we study the effect of solar flares on earthquakes, it has been observed that since 2015 till 2022 we have detected x class solar flares that followed by a series of earthquakes of magnitude larger than 6 M.According to our study we expect a series of earthquakes occuring in this month due to the x class solar flares observed at the beginning of it.

Session: screen 03
Abstract ID: 30

Solar energetic particles as space weather drivers in the near Earth environment: A new Egyptian-Bulgarian Project

Susan Wassem Samwel[1], Rositsa Miteva[2], Makram Ibrahim[1], Mohamed Darwish[1], A. Abulfwa[1], Kamen Kozarev[2], Mohamed Nedal[2], Nikola Petrov[2]

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Abstract

A new inter-academy project between the National Research Institute of Astronomy and Geophysics (NRIAG) and the Institute of Astronomy and National Astronomical Observatory - Bulgarian Academy of Sciences (IANAO-BAS) is initiated. The main objectives and structure of the project will be presented. The project focuses on solar energetic particles accelerated during solar eruptions and propagating through the heliosphere, in addition to their impacts on space technology at near earth environment. The work package includes validation of new SEP forecasting methods, Remote and in situ observation of the origins of SEP events and evaluation of satellite risks due to these solar energetic particle events. The aim is to improve the scientific understanding of the chain of physical processes that take place from the solar corona to near Earth orbit.

Session: screen 03
Abstract ID: 58

Solar Energetic Particles on the Terrestrial Environment, trends, prediction and alerts

Magda Moheb, Ahmed Abulwfa, Sara Said
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Abstract

Solar Energetic Particles (SEPs) are ejected from the Sun's surface during solar flares, coronal mass ejections, and other explosive events. SEPs are made up of protons, electrons, and nuclei that are released from the sun's outer atmosphere. The impacts of SEPs on the Terrestrial Environment, and highlights the importance of understanding their functionality (Trends, Predictions, and Alerts) are the goals of this article.Regression analysis is implemented on secondary data from NOAA data center to elaborate the impacts of SEPs on the Terrestrial Environment Studying the effects of SPE's provides clear information to predict the future trends which increases the ability of interested scientific community setting alerts and precaution to prevent SPE's hazards.

Session: screen 03
Abstract ID: 40

Nord Sea 1and Nord Sea 2 Gas Leaks in Response to Start of Aurora and Magnetic Storms on 26 of September 2022 and the Corresponding Induced Telleric Current

M. A. Semeida[1], Shahinaze Yousef[2]
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Abstract

The 2022 aurora and magnetic storms season started on 26 September causing strong Ionospheric electric current. Such Ionospheric current in turn induced strong Telleric electric current at the bed of the Boltic sea off the coast of Denmark and Sweeden. This initiated erosion that led to several gas leaks in Nord sea 2 followed by Nord sea 1 gas pipe lines.Earlier stoppage of Russia of gas feeding to the pipe lines caused the termination of gas Leaks.Certainty, the successive gas Leaks are not the acts of sabatage but are natural consequences of solar activity and the induced Telleric Current.

Session: screen 03
Abstract ID: 59

PV systems feeding satellites and their impacts by solar Energetic Particles in LEO

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Abstract

Many spacecraft and artificial satellites are located at Low Earth Orbit (LEO) to reduce risk of radiation damage and exposure at higher orbits. The trapped particles in the radiation belts play a crucial role in affecting the spacecraft in any orbit. Orbiting spacecraft affected by the space environment through their interactions. In this paper, a study of the impact of space radiation hazard in an LEO Equatorial orbit environment due to advantages development of spacecraft in these environments. In addition, the radiation damage, total dose and radiation flux, and kind of device loaded should be clearly quantified. Statistical analysis techniques are implemented on secondary data from NOAA data center to elaborate the impact of SPE's on LEO.Studying the effects of radiation environment on LEO spacecraft is very important to mitigate and to protect spacecrafts from serious damages. The development of LEO-Equatorial orbit satellite is required for Equatorial countries, that increases daily coverage region than the polar satellite.

Session: screen 03
Abstract ID: 60

Impact of solar energetic particles events on ultraviolet radiation

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Abstract

Solar activity is the major driving force behind Earth's climate, and the realization of solar phenomena is the key to understanding and predicting climate and environmental changes. Solar radiation is a type of energy from the sun that is related to its activity variation, it is a major influence in climate and weather systems that cause heat, light, ocean currents, and weather patterns.Solar Energetic Particle (SEP) events are the product of a broad set of physical processes from the corona out through the extent of the heliosphere, and provide insight into processes of particle acceleration and transport. SEP events pose a radiation hazard for aviation, electronics in space, and human space exploration,The significant effects of solar activity especially solar energetic particles (SEPs) on solar radiation that reaches Earth represented by ultraviolet radiation, is the subject of this study. The UV component of terrestrial radiation from the midday sun comprises about 95% UVA and 5% UVB; UVC and most of UVB are removed from extraterrestrial radiation by stratospheric ozone.Extreme-ultraviolet (EUV) waves appear as large-scale expanding disturbances in the corona.Satellite and spatial data were studied using statistical analysis using the Python language.

Session: screen 03
Abstract ID: 33

Disappearance of Egyptsat-1

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Abstract

The aim of our present work is to identify if the solar activity parameters have any effect of the interruption of the coming signal from Egyptian satellite “Egypt sat-1” which have been lost totally since 19 July 2010. So we are heading our best to study the effect of the main factors that can affect the degradation or the damage of the electronic components of the satellites. The most characterized solar activity variations: are solar wind, Mega storm, solar flare, coronal mass Ejection (CMES)…etc. which is causing solar storm eruption. Focusing on these incoming factors we found that none of them are responsible for the complete loss of the satellite signal.We conclude that the sun activity hasn’t conspicuous effect on Egypt sat-1.

Session: screen 03
Abstract ID: 100

DFT and QSAR Studies of PTFE/ZnO/SiO, Nanocomposite

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Abstract

Polytetrafluoroethylene (PTFE) is one of the most significant fluoropolymers, and one of the most recent initiatives is to increase its performance by using metal oxides (MOs). Consequently, the surface modifications of PTFE with two metal oxides (MOs), SiOz and ZnO, individually and as a mixture of the two MOs, were modeled using density functional theory (DFT). The B3LYPL/LANL2DZ model was used in the studies conducted to follow up the changes in electronic properties. The total dipole moment (TDM) and HOMO/LUMO band gap energy (AE) of PTFE, which were 0.000 Debye and 8.517 eV respectively, were enhanced to 13.008 Debye and 0.690 eV in the case of PTFE/4ZnO/4SiOz. Moreover, with increasing nano filler (PTFE/8ZnO/8SiOz), TDM changed to 10.605 Debye and AE decreased to 0.273 eV leading to further improvement in the electronic properties. The molecular electrostatic potential (MESP) and quantitative structure activity relationship (QSAR) studies revealed that surface modification of PTFE with ZnO and SiO, increased its electrical and thermal stability. The improved PTFE/ZnO/SiO, composite can, therefore, be used as a self-cleaning layer for astronaut suits based on the findings of relatively high mobility, minimal reactivity to the surrounding environment, and thermal stability.

Session: screen 03
Abstract ID: 103

Statistical analysis of geomagnetic storm according to solar activity during the last two solar cycles

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Abstract

The aim of the study: an attempt to search for the prediction of geomagnetic storms through characteristics of the solarevents. We present the results of the chain of events that originated from the Sun to the Earth and that ultimatelyleads to 104 intense geomagnetic storm events with Min. Dst ≤ -100 nT during 1996 -2018. The storms associated withCME+flare is 59, CME-only is 27, flare-only is 5 and CIR/CH is 13, respectively. Most of the events originate in solaractive regions. We have identified the start and ending times of the Interplanetary Coronal Mass Ejection (ICME).We also find that most major geomagnetic storms are driven by a fast halo-CME associated with a major flare. Therewere only three and eight events for CIRs during the rising and declining phases of the solar cycle 23, respectively.Hence, more than two thirds of these major storms are created by CME+Flare, while the rest of the events resultedfrom multiple solar events. CIRs originate from high speed stream emanating from coronal holes (CHs). CIR is oftenassociated with weak and moderate storms, and rarely with strong storms (i.e. Dst < -150 nT). There are some casesto CIRs responsible for driving the storm as follows: The first case the CIR interacted with a preceding ICME, secondcase the CIR alone originate coronal hole. We have carefully examined the sources of the major geomagnetic stormgroup caused by properties of the solar and interplanetary during this period. We classify the Solar-IP sources of majorgeomagnetic storms into three types:1. The storm is associated with Coronal Mass Ejection (CME).2. The storm is associated with flare.3. The storm is associated with Co-rotating Interaction Region (CIR).

Session: screen 03
Abstract ID: 102

Studying the optical and thermal properties of Cs/ZnO and Cs/ZnO/GO hybrid nanocomposites

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Abstract

Green nanotechnology, defined as the synthesis or hybridization of nanomaterials with natural bioactive com- pounds, is a low-cost, eco-friendly, easy-to-manage and non-toxic technology. Nanocomposites have recently gained attention due to their unique characteristics and applications in the fabrication of microelectronic cir- cuits, sensors, piezoelectric devices, optoelectronic components, fuel cells, corrosion surface passivation coatings, and catalysts. Accordingly, chitosan (Cs), a bioactive polymer, was hybridized with nanomaterials including ZnO and graphene oxide (GO) utilizing two easy, eco sustainable, and low-cost methods of preparation. All samples were analyzed using different analytical techniques. The FTIR and NMR results confirmed that the interaction between Cs, ZnO and GO occurs through the NH2 function group of Cs with ZnO and the O of the carboxyl group COOH of GO. Furthermore, the SEM data show the agglomeration generated by ZnO and GO on the Cs surface. According to the optical characterization of hybrid Cs/ZnO/GO, the one-pot preparation method achieves the lowest indirect and direct optical band gap values of 0.176 and 3.18 eV, respectively. Furthermore, it has a larger Eu = 5.46 eV value than the other samples, indicating a higher degree of disorder and high conductivity. Finally, the TGA results showed that hybridization of Cs with ZnO and Go improved the temperature decomposition and degradation of Cs by 79.9%. As a result, the one-pot approach for creating CS/ZnO/GO hybrid nanocomposite is effective for preparing Cs/ZnO/GO as an optoelectronic material.

Poster Session

VIP Room

1st Day, 13.02.2023

Screen 4: Education and Outreach Astronomy

Chairman: Somaya Saad

03:20-03:30	**Virtual Observatory as an Education Tool** S N Hasan , Priya Hasan
03:30-03:40	**The African Cosmology and Astrophysics Strategy** Lerothodi Leeuw
03:40-03:50	**Astronomy as the leader of inter and multi-disciplinary sciences** Areg Mickaelian
03:50-04:00	**Promoting Astronomy Education in Ghana through School visits and Astronomy Clubs** Albert Forson , ETO Okwei , E. Proven-Adzr , K. Ahenkora-Duodu , Joshua Kalognia , Sarah. Abotsi-Masters , Francis Andorful , A. Forson

Session: screen 04
Abstract ID: 95

Virtual Observatory as an Education Tool

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Abstract

We will demonstrate with examples how analysing astronomical data may be utilised to teach students about data analysis, statistics, programming, and other research-related topics. We will specifically mention our IAU-OAD projects “Astronomy through Archival Data,” and “AstroSprint” where we have created a library of instructional films and reading material for graduate and undergraduate students. There will also be discussion and use of virtual observatory technologies. Community members are free to use the developed materials.

Session: screen 04
Abstract ID: 34

The African Cosmology and Astrophysics Strategy

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Abstract

We will give an update on the African Cosmology and Astrophysics Strategy (see, https://africanphysicsstrategy.org), invite you and discuss options and opportunities for participation .

Session: screen 04
Abstract ID: 110

Astronomy as the leader of inter and multi-disciplinary sciences

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Abstract

The leading role of Astronomy in the development of inter- and multi- disciplinary sciences between Astronomy and all other natural sciences is explained in providing vast amount of new data from Space, namely data useful for the expansion of our knowledge that before was based only on the information collected on the Earth, in fact a tiny part of the studied Universe. This way Astronomy also becomes the key science for Big Data collection, storage, reduction, analysis and interpretation. All these data become basis for development of Astronomy related interdisciplinary sciences, such as Astrophysics, Astrochemistry, Astrobiology, Planetary Science or Planetology (Astrogeology), Astroinformatics, Archaeoastronomy, etc. We will review the current situation with inter- and multi- disciplinary sciences and the leading role of Astronomy in their formation and development.

Session: screen 04
Abstract ID: 80

Promoting Astronomy Education in Ghana through School visits and Astronomy Clubs

Albert Forson[1] , ETO Okwei[2] , E. Proven-Adzr[3] , K. Ahenkora-Duodu[4] , Joshua Kalognia[5] , Sarah. Abotsi-Masters[6] , Francis Andorful[7] , A. Forson[1]

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Abstract

PRAGSAC (Promoting Astronomy in Ghana through School Visits and Astronomy Clubs) is a STEM outreach programme that uses school visits and the formation of astronomy clubs to increase astronomy education and communication in Ghana. The Ghanaian government and other organizations are concerned that only a small number of students are interested in pursuing STEM subjects, such as astronomy. Furthermore, astronomy is not currently taught in Ghanaian schools or colleges, and little is known about the GRAO since its inception in 2017.After realizing the importance of astronomy to development and the need to communicate astronomy, a group of enthusiastic students founded the PRAGSAC program. The team's goal is to create awareness of Ghana's Radio Astronomy Observatory (GRAO) and promote astronomy education through school visits and outreach programmes. By targeting Junior High Schools (JHS), the PRAGSAC team seeks to motivate students to continue to pursue STEM throughout their academic career.We piloted an astronomy outreach programme in seven JHS in Ghana, with a trained teacher at each school to run the astronomy clubs. During the astronomy club engagements and the teacher training workshop, an inquiry-based teaching and learning methodology was used, allowing both students and teachers to explore, ask questions, and use hands-on activities to consolidate learning and combine fun with practical inspiration. We performed pre and post evaluation surveys, in addition to a longitudinal survey. These show that students not only learn a lot from this programme, but they also are inspired to continue their STEM education through senior high school. This method is recommended as one of the approaches for promoting STEM in schools and increasing public awareness of astronomy. The purpose of this talk is to highlight the findings and initiatives that were used to raise GRAO awareness and communicate astronomy to the public through astronomy clubs.