Understanding Astronomy in China through Recent Major Projects

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Dear colleagues,

Good afternoon!

When I was President of the Chinese Astronomical Society, our application to host the IAU 28th General Assembly in Beijing became successful. Today I am glad to be here to attend the opening ceremony of IAU 28th GA. I wish this meeting a success and I wish all participants a happy and memorable time in China.

China learned its modern science and technology from the West. However, any nation with some self-respect is not satisfied with always following advanced countries. We hope that one day we can catch up with them, and even surpass them in some fields. In the 20th century, because of Japanese invasion, the Chinese civil wars, and various political campaigns, until 1976 Mainland China was poor and undeveloped. By now, however, much of this situation has changed. China's GDP has risen to the second highest in the world. China is now one of the most advanced countries with respect to the supercomputer, steelmaking, hydraulic engineering, the high-speed train, the modern bridge, and so on. In addition, China has carried out manned space missions and lunar exploration, and has set up a space lab.

Please allow me to limit my talk to Mainland China's projects since 2006.

I. The ground-based optical-infrared projects

1. LAMOST - Large Sky Area Multi-Object Fiber Spectroscopic Telescope

The Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST) is an innovative reflecting Schmidt telescope. LAMOST has a clear aperture of 4.3 meters and a field of view of 5°. It is the largest wide field-of-view telescope in the world. 4000 optical fibers are put on its focal surface. Such a large-scale slit spectroscopic survey is unprecedented. At present, several other projects around the world are being planned along this direction. LAMOST was completed in October 2008. LAMOST is an 8m-class telescope. Through the development of LAMOST China has proved the basic ability to develop a 30m-class telescope.

2. NEOST - Near-Earth Object Survey Telescope NEOST is a 1m Schmidt telescope.

3. NVST - New Vacuum Solar Telescope NVST, with a 1m aperture, is the largest vacuum solar telescope in the world.

4. ONSET - Optical and Near-Infrared Solar Eruption Tracer ONSET can obtain white light, Hα and 10830 Å images at the same time.

All these projects are completed.

II. The ground-based radio projects

1.21CMA - 21 Centimeter Array

Exploration of the neutral hydrogen reionization may be the last frontier in observational cosmology. 21CMA is a radio array for this goal. It was constructed in the Tianshan Mountains in west China. A total of 10287 antennas have been deployed along two perpendicular baselines of 10 km. 21 CMA was completed in 2007. It is the first facility of this kind in the world to start the search for the epoch of reionization.

2. CSRH - Chinese Spectral Radioheliograph

Images over centimeter and decimeter wavelengths are important for addressing fundamental problems in solar flares and coronal mass ejections. The Chinese Spectral Radioheliograph

(CSRH) will be the first new-generation instrument of this kind in the world. It can obtain images with high temporal, spatial, and spectral resolutions simultaneously. It includes two arrays. The CSRH-I has been installed. The CSRH-II will be finished next year.

3. Shanghai 65m radio telescope

This is Shanghai 65m radio telescope. It is also a bridge for China to develop larger steerable radio telescopes. It will be completed this year or next year.

4. FAST - Five-hundred-meter Aperture Spherical Radio Telescope

The Five-hundred-meter Aperture Spherical Radio Telescope (FAST) can be seen as a modified "Arecibo" type telescope, with an illuminated area of 300 meters in diameter, twice as large as the Arecibo. In FAST the main innovation is that the shape of the basic spherical reflector is changed to keep the illuminated area a paraboloid in real time. It will be completed in 2016. FAST will be the largest single-aperture radio telescope in the world.

III. The space projects

1. HXMT - Hard X-ray Modulation Telescope

The Hard X-ray Modulation Telescope (HXMT) works in 1-250 keV. It will obtain sky maps with high spatial resolution and sensitivity. HXMT also has a unique capability to study short time-scale variations with high spectral resolution.

2. DAMPE - Dark Matter Particle Explorer

A Chinese astronomer, through international cooperation by balloon observation, found “an excess of cosmic ray electrons at energies of 300-800 GeV. ” These electrons may arise from the annihilation of dark matter particles. This find has claimed worldwide attention, and China has decided to develop a satellite named Dark Matter Particle Explorer (DAMPE) to further detect the high energy electrons and gamma ray. In energy resolution (1.5% at 1TeV), energy detection range (5-10,000 GeV), and background level, DAMPE surpasses other similar projects.

3. DSO - Deep Space Solar Observatory DSO includes a 1m telescope, mainly to study the solar magnetic field.

4. SVOM - Space Variable Object Monitor (China and France) SVOM is a Chinese and French joint mission to study gamma-ray burst.

5. POLAR - Gamma-ray Burst Polarization Observation Experiment (an international collaboration project led by China)

All these projects will be launched between 2014 and 2016.

Dome A is the summit of the Antarctic icecap, where the Chinese Expedition Team made the first recorded human arrival in January 2005. Antarctica has the best astronomical sites on the ground.

A second-generation Chinese Antarctic Survey Telescope AST3-1 with an aperture of 50 cm was installed there in January this year. At present, it is the largest optical telescope in Antarctica. The following projects are being planned or conceived:

1. Antarctic Astronomical Observatory The third-generation Antarctic telescopes include a 2.5m optical-infrared telescope and a 5m THz telescope.

2. 20-30m Optical-Infrared Telescope China has no large-aperture telescope for fine observation. So it is important to develop such a telescope.

3. 110m Steerable Radio Telescope

4. Large Solar Telescope (aperture $\geq$ 4m)

5. LAMOST South

6. 2m Space Optical Survey Telescope

7. XTP - X-ray Timing and Polarization Mission

and others.

Other countries are welcome to participate in all Chinese projects and China will also be pleased to join the projects of other countries.

At present China is not yet one of the leading countries in astronomy, but it is approaching this goal. China has a brilliant ancient civilization, it has the largest population, and has recently made great economic achievements. China should make greater contributions to science and to humankind.

Thank you!