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LAMOST and China-VO

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Abstract. LAMOST is a special reflecting Schmidt telescope used to observe ten million spectra of celestial objects. There are about half million spectra released in the pilot survey of LAMOST. In the "Big Data" era of astronomy, Virtual Observatory will play an important role to make use of those massive spectral data of LAMOST.

Keywords. telescopes: LAMOST, techniques: spectroscopic, astronomical data bases: virtual observatory

1. LAMOST

The Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST) is a special reflecting Schmidt telescope (Cui, Zhao, Chu *et al.* 2012). LAMOST breaks through the bottleneck of the large scale spectroscopic survey observation with both large aperture (effective aperture of 3.6m to 4.9m) and wide field of view (5 degrees). It is an innovative active reflecting Schmidt configuration achieved by the active optics technique. The focal surface has precisely positioned 4000 fibers connected to 16 spectrographs with the distributive parallel-controllable fiber positioning system, and thus the LAMOST can observe up to 4000 objects simultaneously. LAMOST is the telescope of the highest spectrum acquiring rate.

LAMOST project was approved as a national major science project by Chinese government in April 1997. LAMOST started to be constructed in September 2001. The installation of all LAMOST subsystems was completed in August 2008. The telescope is located in the Xinglong station of National Astronomical Observatories, Chinese Academy of Sciences. After the two year commission period from 2009, it did a pilot spectroscopic survey with LAMOST from October 2011 to June 2012 (Zhao, Zhao, Chu *et al.* 2012).

More than 480,000 spectra of objects are being released to Chinese astronomers and international collaborators (Newberg, Carlin, Chen *et al.* 2012). About 320,000 high quality spectra of the pilot survey data was released to public in August 2012 (Luo, Zhang, Zhao *et al.* 2012).

The key scientific goals of LAMOST including: (1) the extragalactic spectroscopic survey for the large scale structure of the Universe and the physics of galaxies; (2) the stellar spectroscopic survey on the structure of the Galaxy; (3) the cross identification of multi-waveband surveys (Zhao 1999). The spectroscopic survey carried out by the LAMOST of near ten millions of galaxies and quasars will make substantial contribution to the study of extragalactic astrophysics and cosmology, such as the large scale structure of the Universe, the baryon acoustics oscillations, the dark energy and dark matter, the formation and evolution of galaxies, the accretion process of the massive black holes in the active galactic nuclei, and so on. Its spectroscopic survey of near ten millions of stars will make substantial contribution to the study of the stellar astrophysics and the structure of the Galaxy, such as the spheroid substructure of the Galaxy, the galactic gravitational

potential and the distribution of the dark matter in the Galaxy, the extremely metal poor stars and hypervelocity stars, the 3D extinction in the Galaxy, the structure of thin and thick disks of the Galaxy, and so on. Its spectroscopic survey combining with the surveys in other wavebands, such as radio, infrared, ultraviolet, X-ray and gamma-ray, will make substantial contribution to the cross-identification of multi-waveband of celestial objects.

2. China-VO

Virtual Observatory (VO) is a data-intensively on-line astronomical research and education environment, taking advantages of advanced information technologies to achieve seamless, global access to astronomical information. VO aims to make multi-wavelength science and large database science as seamless as possible, and it will act as a facility class data infrastructure (Lawrence 2009).

The organization to coordinate global development on the VO and cultivate its awareness and usage is the International Virtual Observatory Alliance (IVOA), which has 17 members currently. It emphasizes the role of VO for future astronomers and requires all new projects data to be VO-compliant.

Chinese Virtual Observatory (China-VO) is the national VO project in China initiated in 2002 and as a national member of IVOA. The China-VO is focusing on developing a platform which could be used for unified access to on-line astronomical resources and services, VO-ready projects and facilities, VO-based astronomical research activities, and VO-based public education (Cui & Zhao 2004) .

Now China-VO is the data access platform of LAMOST data archive.

3. Summery

The spectroscopic survey of LAMOST will obtain ten million spectra. To rise the scientific productivity of LAMOST, it needs to develop advanced methods such as spectral fitting, photometric search, catalogs cross-matching and data mining technology to identify unknown relations and patterns in large-scale data and to discover new classes of extremely rare astrophysical objects (Zhang & Zhao 2006; Peng, Zhang, Zhao, Wu 2012). And the data archive of LAMOST could be used as a good scientific resources for data archiving, data fusion, data mining, machine learning with the VO technology and methods of astroinformatics.

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