

Drawing a portrait for the Milky Way with LAMOST survey

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Chao Liu got his PhD degree at National Astronomical Observatories, CAS (NAOC) in 2008. Then he worked at Max-Planck institute for Astronomy, Germany, as a postdoc for three years. During his working in Europe, he was involved in the Gaia mission as a member of the data processing and analysis team. Since 2012, he became a staff member at NAOC. His interests of science include the Milky Way, galactic dynamics, stellar physics, and interstellar medium.

As basic bricks of the universe, galaxies play crucial roles in running the whole cosmos. Among the galaxies, the Milky Way is the nearest one and hence provides a unique opportunity to observe a galaxy from inside. The knowledge that the astronomers learn from the Milky Way can be the key to unveil the secrets of billions of the similar gigantic stellar systems. However, systematically observing the Milky Way is extremely expensive.

As one of the largest spectroscopic survey, LAMOST project has obtained about 9 million low resolution stellar spectra in the past 5 years. The LAMOST observed giant stars can well cover the Galaxy as far as the distance of 100 kpc. These data well sample in the Galactic anti-center direction as well as the high Galactic latitude and allow us to better understand the assemble of the Galaxy especially its outskirt region.

In this talk, I will firstly outline the telescope and the survey data and then demonstrate the new discoveries in the outskirt of the Milky Way from the LAMOST data. About the outer disk, we find that it does not show truncation or break, but smoothly transit to the halo at ~ 20 kpc. This means that the Galactic stellar disk is larger than we previously know. Meanwhile, I will demonstrate the outskirt substructures unveiled from the LAMOST data, such as the flare, the asymmetric features etc. We also carefully measured the shape of the Galactic stellar halo within 40 kpc from the center. For the first time, we confirmed that the stellar halo is oblate in the inner region and becomes spherical in the outer region. I will briefly discuss what the complicated shape of the stellar halo implies in the formation of the Galaxy.