Milky Way Outskirts Hotter, Thicker than Previously Thought

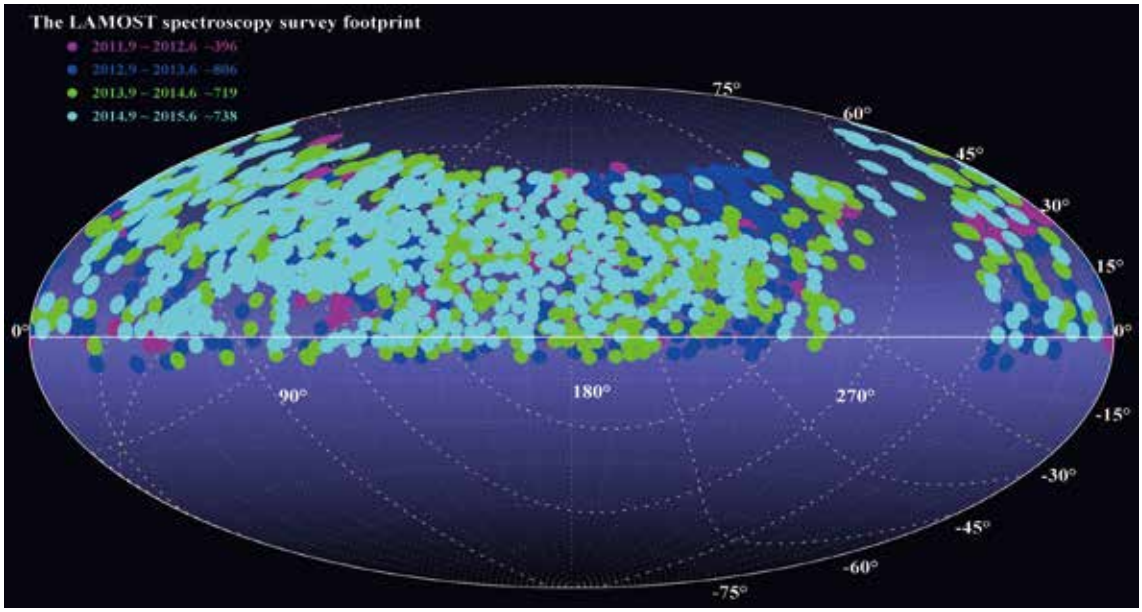
Using action-based methods and anti-center K-giant data from the Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST), a group of researchers at the National Astronomical Observatories, CAS have re-examined the outskirts of the Milky Way Galaxy and found them apparently larger and thicker than astronomers had previously thought. Their discovery will provide new insights into the formation of the Milky Way disk and challenge the conventional dynamical models.

As a typical spiral galaxy, the Milky Way Galaxy helps us better understand the formation and evolution of similar spiral galaxies. For a long time, the motions of stars have been used to study the structure of our Galaxy. For instance, astronomers have developed a number of different models to describe velocity distribution at different spatial positions. Among them, torus modeling is a comparatively new method, which is especially effective when it comes to certain evolution problems concerning major galactic components such as disk structures.

When such a modeling method was developed by scientists at Oxford University, they used it to analyze data from earlier Milky Way surveys. Their work well explained the motions of stars in the immediate solar neighborhood within about 6,000 light years. Meanwhile, the recent survey work done by LAMOST has accumulated enormous amount of data in the anti-center direction of the Milky Way out to 60,000 light years away.

Using LAMOST data, NAOC researchers have successfully revealed a significant feature in the dynamics of the outskirts of the Milky Way disk. The disk was found to have a kinematically hotter and thicker structure than previously thought. This structure implies that the formation of the Milky Way may be more complicated than what we understood.

Their research will be published in the *Monthly Notices of the Royal Astronomical Society* (MNRAS).



On June 30, 2017, LAMOST issued its third Data Release (DR3) to astronomers worldwide. DR3 contains all spectra LAMOST obtained during its pilot survey and the first three years' regular survey (footprint shown as above). Through DR3, a total number of 5.75 million spectra were released to the international community, including 4.66 million high-quality spectra with signal noise rate ≥ 10.