Chinese Astronomers Identify Nitrogen-Enhanced Field Stars in LAMOST DR3

As a bar-spiral galaxy, our Milky Way (MW) is quite active chemically and dynamically. Among our MW stars, is it possible to know the evolution of each star, in order to accurately study the MW formation and evolution? Recently, chemodynamics scholars try to understand the stellar and MW evolution history using both chemical and dynamic information. In this respect, nitrogen-rich field stars are a group of very interesting stars: we usually find high nitrogen (N) abundances in globular cluster (GC) stars, but now this kind of stars are also found in the field. Do they come from GCs, or from other sources? This may change our understanding about the mutual interaction between MW and star clusters.

Recently, TANG Baitian from Sun Yat-sen University, LIU Chao from the National Astronomical Observatories of Chinese Academy of Sciences (NAOC), and other collaborators found 44 N-rich metal-poor field red giants from LAMOST Data Release 3 (DR3). These stars are rare by their nature (<1% of the parent sample), and their origin is still unknown. This work greatly increased the currently available sample size, and was recently accepted by the world-renowned *Astrophysical Journal*.

The N-enhancement of these stars was confirmed using their derived N abundances from both APOGEE and LAMOST spectra. It is clear that this group of stars have higher N abundances compared to other normal metal-poor field red giants, indicating special nucleosynthesis is required to explain their origins. Next, TANG Baitian *et al*. combined 3D positions and 3D velocities of these stars with the MW gravitational models to simulate their orbits. The results from Monte-Carlo simulation indicate that these stars have high eccentricities, and some of them are count-rotating in our MW. According to their chemical and kinematic information, TANG Baitian *et al*. speculated these stars may come from MW GCs, dwarf galaxies, or extragalactic GCs. More data is needed before drawing a firm conclusion.

In the near future, TANG Baitian *et al*. will continue to explore N-rich stars, by using the latest version of LAMOST data to expand the sample size. At the same time, high-res spectra from large telescopes will tell us better stories about N-rich star origins with more chemical abundances and radial velocities at different epochs.

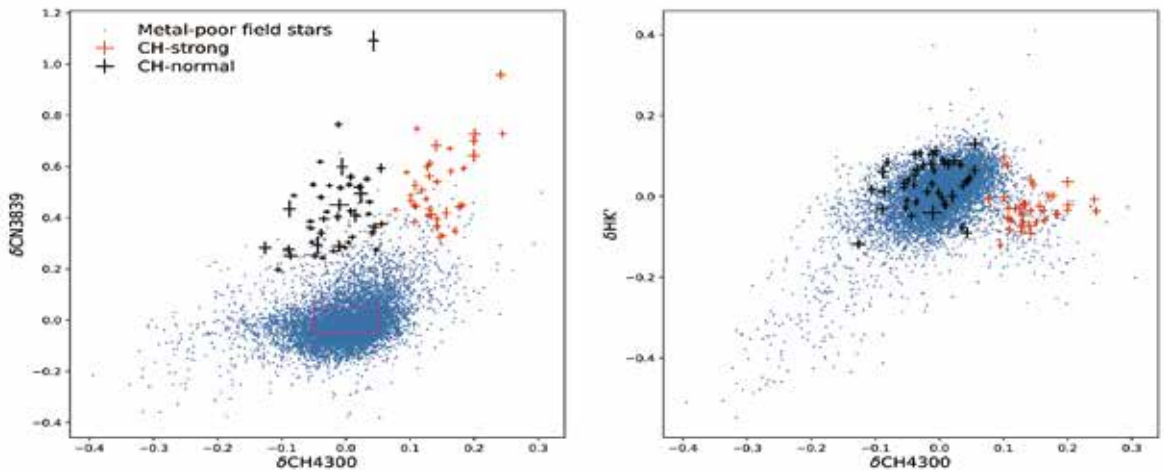

Figure: After measuring CN and CH spectral indices from the LAMOST spectra, TANG Baitian *et al*. have identified 44 CN-strong CH-normal stars (N-rich stars, black pluses), and 35 CN-strong CH-strong stars (CH stars, red pluses). Background stars are normal metal-poor field red giants. (Image by courtesy of TANG Baitian's team)