LAMOST's view on the Gaia-Sausage-Enceladus merger event

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A combination of massive spectroscopic surveys and Gaia DR2 has brought light into the chemical and kinematical properties of a large number of stars, thus building up a mature picture of the Gaia-Sausage-Enceladus (GSE) galaxy and unraveling its impact on the reconstruction of the history of our Galaxy.

Based on the largest spectroscopic data set established in the LAMOST survey [1,2], Profs. Gang Zhao and Yuqin Chen (National Astronomical Observatories, Chinese Academy of Sciences) recently explored the chemical and orbital properties of metal-rich Sausage-kinematic (MRSK) stars [3], and delivered a new picture of the GSE merger. That is, the GSE has a metal-rich component with both high- α and low- α ratios, which are well reproducible in a hydro-dynamical simulation [4], where the GSE galaxy is a clumpy Milky-Way analogue that develops a bimodal disk chemistry. They also revealed an interesting response of our Galaxy to this ancient accretion event by discovering a pile-up of MRSK stars at $Z_{\text{max}}=3\text{--}5$ kpc [3], which led to the formation of a disk-halo transition at $|Z|=4$ kpc.

The LAMOST data has two advantages: a huge number of stars for good statistics, and the disk metallicity for the majority of these stars, greatly benefiting this exploration on

the rare MRSK population [3]. This work demonstrates the great potential of the upcoming Chinese Space Survey Telescope, a deep-field photometric and spectroscopic survey, to shed light on the complicated merger history of our Galaxy through chemical and kinematical analysis [5].

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