**Analysis of the Existence of Two Populations on Galactic Stellar Halo**

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ABSTRACT

Stellar Halo is one of the Galactic components which has a spheroidal shaped surrounding the Galaxy. Even though containing 1% of the total stellar mass, stellar halo is an important component for understanding formation history and the evolution of the Galaxy. The oldest and metal-poor stars are suspected found on stellar halo. Its metallicity and orbital motion provide nature information of first stars in the universe.

Carollo et al. (2007,2010) concluded the existence of a dual stellar halo (inner and outer halo) by using Data Release 5 and 7 from Sloan Digital Sky Survey. An inner halo consists of a prograde and metal-rich ([Fe/H] ≈-1.6) population and an outer halo which has a distinct retrograde, more metal-poor ([Fe/H] ≈-2.2) stars. However, Schӧnrich et al. (2011) did not obtain the two components of Stellar Halo although using the same data. Those two works using photometric parallax for estimating the star's distance. Therefore the stars distance estimation is important in the analysis of the existence of populations in stellar halo.

In this work, we will re-examine the kinematics of the Galactic stellar halo using the newest astrometry survey, Data Release Two of The Gaia satellite mission (GDR2). The distance will be derived from the trigonometric parallax method with extremely good precision. We will use spectroscopic data sets from Data Release 5 of Radial Velocity Experiment (RAVE DR5) to cover stars at southern hemisphere and for northern sky using Data Release 4 of Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST DR4). K-means method will be used for clustering analysis to acquire conclusion whether a dual stellar halo is required to explain the pattern of the data or a single stellar halo is sufficient to describe those data.

*Keywords:* Galaxy: Stellar Halo; Galaxy: kinematics and dynamics; K-Means

References

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| [1] | Carollo et al., Nature **450** (2007) 1020-1025 |
| [2] | Carollo et al., *The Astrophysical Journal* **712** (2010) 692-727 | |
| [3] | R. Schӧnrich, M. Asplund, L. Casagrande, *Monthly Notices of the Royal Astronomical Society* **415** (2011) 3807 | | |
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