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The GALAH Survey: The mass assembly of the Milky Way as reconstructed from integrated GALAH spectra

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ABSTRACT

We use the method developed by Boecker et al. (2019) to estimate the mass assembly of our Milky Way with integrated spectra from the GALAH survey. By mimicking an observation of stellar spectra from an arbitrary point (far away from the Milky Way stellar disk, we can treat the Milky Way like an extragalactic object for which the method by Boecker et al. (2019). We confirm the inferred age-metallicity-relation because of the individually available stellar ages and metallicities from stellar spectroscopy (Buder et al. in prep.). We infer the mass of the most massive accreted galaxy onto the Milky Way and compare it with Sagittarius dSph as well as *Gaia*-Enceladus and find that X.

1. Introduction

2. Data selection

We take spectra from the GALAH survey (De Silva et al. 2015) with estimated radial velocities (Buder et al. in prep.) and 5D information from *Gaia* DR2 (Gaia Collaboration et al. 2018). With GALPY (Bovy 2015) coordinate transformations to the Galactocentric coordinate system, we infer i.a. the vertical velocity v_Z.

2.1. Mimicking the observation of extragalactic objects

The method by Boecker et al. (2019) has been used for objects that are situated outside of the Galactic disk, such as Globular Clusters or extragalactic objects.

When we want to apply this method to Milky Way stars, observed within the disk, we have to take into account the influence of the line-of-sight velocities and adjust them to mimic an observation of MW stars from outside the MW.

To mimic the observation of the Milky Way as an extragalactic object, we simply assume that we observe the Milky way from a position $XYZ = (0, 0, 1000)$ kpc, so that the line-of-sight velocity is similar to the vertical velocity, v_Z (to first order). With this Ansatz, we hence only have to shift the observed stellar spectra to the rest frame and then apply a velocity shift with the velocity with respect to the Galactic height, v_Z and then integrate them.

References

Boecker, A., Leaman, R., & van de Ven, G. 2019, MNRAS
Bovy, J. 2015, ApJS, 216, 29
Buder, S., Asplund, M., Lind, K., & The GALAH Collaboration. in prep., MNRAS
De Silva, G. M., Freeman, K. C., Bland-Hawthorn, J., et al. 2015, MNRAS, 449, 2604
Gaia Collaboration, Brown, A. G. A., Vallenari, A., et al. 2018, A&A, 616, A1