[p28] Proper motion measurements for stars with Subaru HSC and SDSS DR11

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Introduction

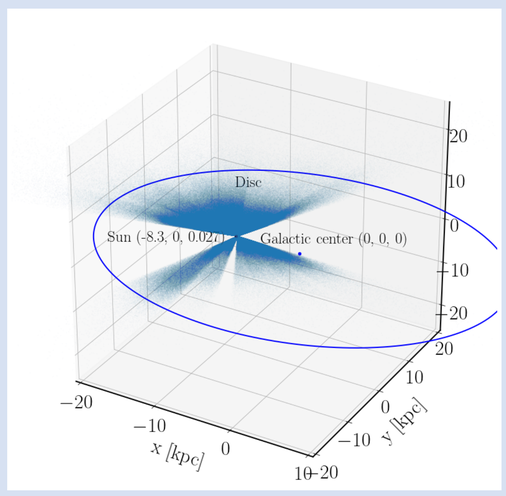
- proper motions are measured by comparing the astrometric positions of the matched stars in the HSC and SDSS catalogs.
- requires long time baselines, accurate astrometry and careful corrections of systematic errors.
- full phase-space information is very informative for proper scientific inferences.

Methods

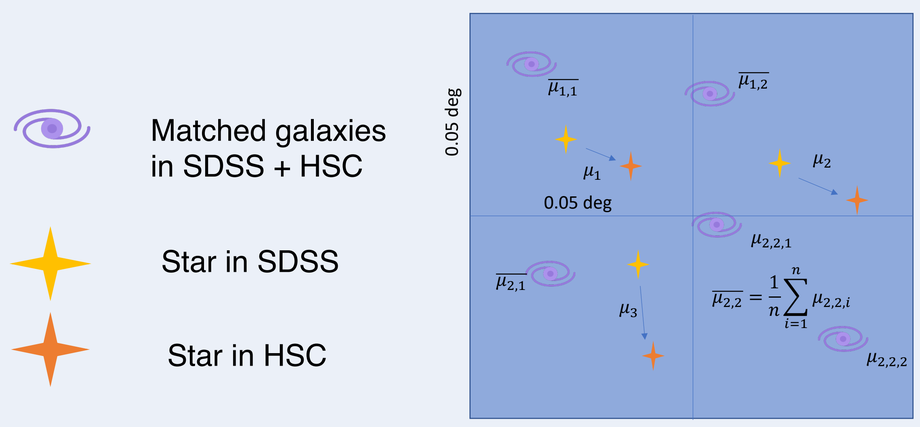
- HSC S20a + SDSS DR11 (14 years time baseline)
- Proper motions of 3.53 million main sequence stars.

$$\mu_\alpha = \frac{\alpha_2 - \alpha_1}{t_2 - t_1}$$

$$\mu_\delta = \frac{\delta_2 - \delta_1}{t_2 - t_1}$$



- Set up 0.05 deg. * 0.05 deg grid to calculate proper motion statistically.



- 4.15 million galaxies to recalibrate the astrometry and set up common reference frame

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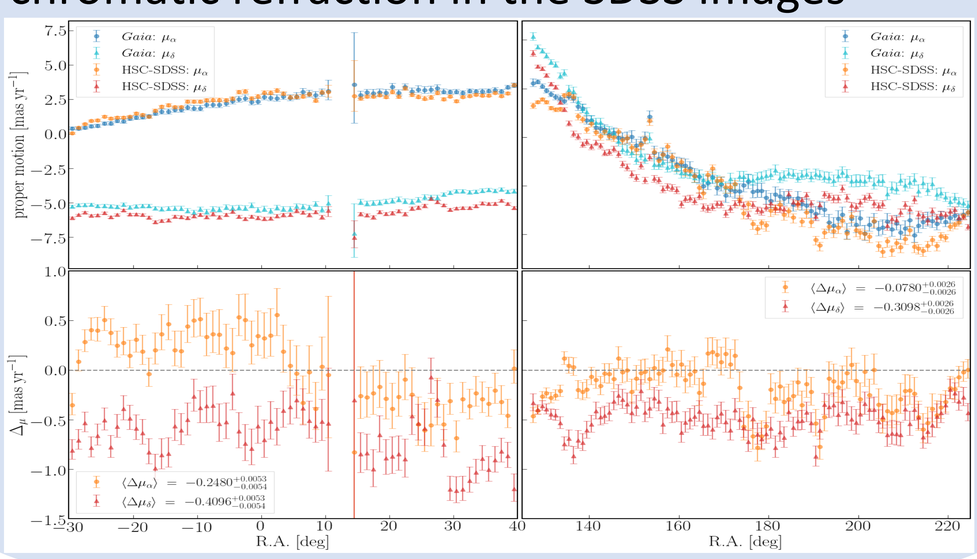
- estimated the absolute magnitude and the photometric distance of each stars from color .

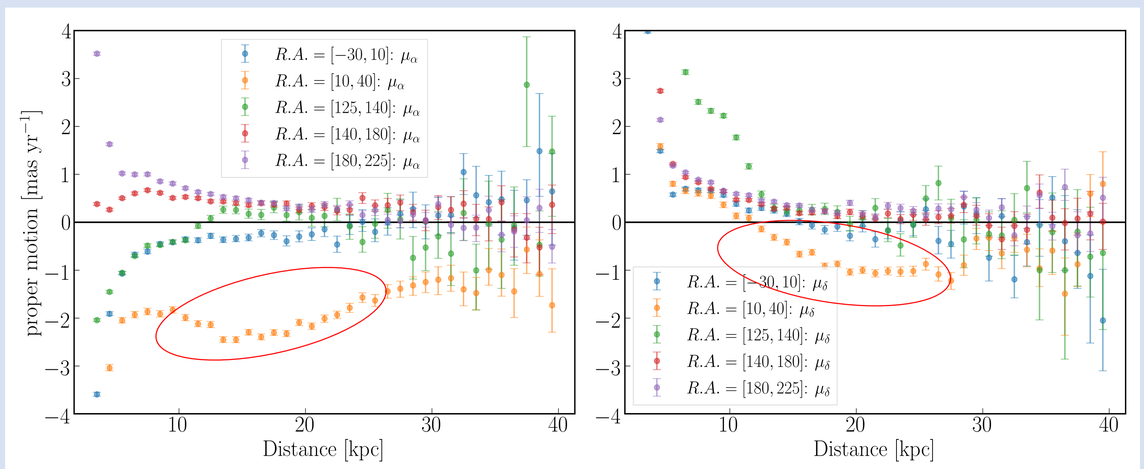
$$M_{r0} = -5.06 + 14.32gi - 12.97gi^2 + 6.127gi^3 - 1.267gi^4 + 0.0967gi^5$$

- Agreement with Gaia's proper motions after correction of e effects due to the differential chromatic refraction in the SDSS images

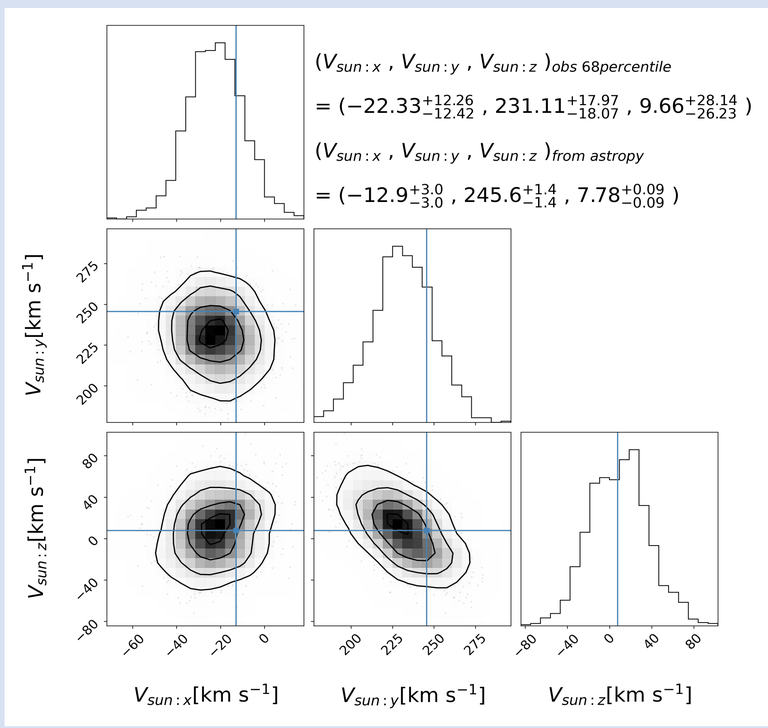


Results

- clear signature of the Sagittarius stream in the halo region of distance range [10, 35] kpc



- Assume that halo stars (d > 10kpc) are statistically rest with respect to the Galactic center, for the regions without Sgr. Stream.
- Use the Markov Chain Monte Carlo (MCMC) method to constrain the solar Galactic reflex motion (treat the proper motion and distance of the solar system as free parameters



Future Work

- Estimate solor motion and position using full data of our catalog.
- Investigate motion and structure of Sagittarius stream by measuring proper motions of member stars.

References

- Ivezić Ž., et al., 2008, ApJ, 684, 287
- Jurić M., et al., 2008, ApJ, 673, 864
- Tian Q., et al., 2020, MNRAS, 501-4, 5149-5175, https://doi.org/10.1093/mnras/staa3975