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A Bayesian Estimation of the Milky Way's Circular Velocity Curve using Gaia DR3

Wednesday, 31 May 2023 12:13 (5 minutes)

The hidden hand of dark matter (DM) shaping the Milky Way remains elusive as the dark substructure of the Galaxy is probed by tracing the dance of celestial bodies in the cosmic shadows. In our work, we exploit the increase of volume and precision in data brought about by ongoing large-scale stellar surveys and use approximately 1.6 million Red Giant Branch stars from Gaia DR3. We present a novel Bayesian inference approach to estimate the circular velocity curve of the Milky Way along with uncertainties that account for various sources of systematic uncertainty as our methodology provides a self-consistent way to quantify uncertainties in the Sun's Galactocentric distance and the spatial-kinematic morphology of the tracer stars. In addition to estimating the circular velocity curve within a range of 5 to 15 kpc, we also infer the DM mass within 15 kpc and predict the local spherically-averaged DM density.

Would you be interested in presenting a poster? (this will not impact the decision on your talk)

no

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