Contribution ID: **250** Type: **not specified**

Measuring Dark Matter in the Solar Neighborhood using Normalizing Flows and Gaia DR3

Tuesday 9 May 2023 14:15 (15 minutes)

Density estimation utilizing normalizing flows enables novel data-driven analyses of galactic dynamics. We train Masked Autoregressive Flows on the kinematic coordinates of 6 million nearby bright stars from the Gaia DR3 catalog within 4 kpc of the Solar location to learn their underlying phase space distribution f(x,v). Assuming dynamic equilibrium, we use f to estimate the local acceleration and mass density field via the collisionless Boltzmann equation. We present a minimal-assumption and model-free measurement of the gravitational acceleration and dark matter mass density in the solar neighborhood.

Authors: PUTNEY, Eric; LIM, Sung Hak (Rutgers University)

Co-authors: SHIH, David; BUCKLEY, Matthew

Presenter: PUTNEY, Eric

Session Classification: DM II

Track Classification: Dark Matter