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Sweeping the Dust Away: An unbiased map of the Milky Way's gravitational potential using unsupervised ML

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Observations of stellar populations are biased by extinction from foreground dust. By solving the equilibrium collisionless Boltzmann equation using machine learning techniques, one can estimate the unbiased phase space density of an equilibrated stellar population and the underlying gravitational potential. Using a normalizing flow-based estimate for the phase space density of stars measured by the *Gaia* space telescope, we estimate the local gravitational potential of the Milky Way as well as the unbiased phase space density corrected for dust extinction. We find that our novel and completely data-driven estimate of these quantities is compatible with recent 3-dimensional dustmaps and analytic models of the Milky Way's potential. We anticipate that this measurement of the potential will probe the detailed structure (and substructure) of the Milky Way's dark matter halo.

Mini Symposia (Invited Talks Only)

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