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Stellar Tracers of the Local Dark Matter Velocity Distribution Over a Range of Galaxy Simulations

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Dark matter (DM) remains one of the central unresolved questions in modern physics. The majority of terrestrial direct detection experiments for DM rely on the assumption that the local DM velocity distribution conforms to the Standard Halo Model (SHM). However, perturbations arising from merger events can induce deviations from the SHM. Previous studies have suggested that the local stellar velocity distribution may serve as a tracer for DM populations originating from the same progenitor systems. In this talk, I discuss how we systematically investigate the impact of the merger history on the correlation between local stellar and DM velocity distributions across multiple halos from the FIRE latte suite. Additionally, we assess the influence of simulation resolution on these results. We find that DM accreted from lower-mass mergers at earlier times exhibits a stronger correlation with its stellar counterpart, highlighting the importance of merger history in interpreting local DM phase-space structure.

References

<https://arxiv.org/abs/1810.12301>

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