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Tao Ren (UC Riverside): Diversity and Uniformity of Rotation Curves from Self-interacting Dark Matter Framework

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Rotation curves of galaxies have diverse behavior in the central regions, but they obey an organizing principle in that the rotation curves can be approximately described by a radial acceleration relation or the Modified Newtonian Dynamics (MOND) phenomenology. We show that both the diversity
and uniformity are naturally reproduced in a hierarchical structure formation model with the simple addition of self- interactions among dark matter particles. We explicitly demonstrate the presence of a radial acceleration relation in the SPARC sample of galaxies using the results of fits to rotation curves with the self-interacting dark matter (SIDM) model.
The inferred stellar mass-to-light ratios and the concentration-mass
relation of the outer halo are consistent with current constrains from
theoretical models and simulations.

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