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Diverse Galactic Rotation Curves and Self-Interacting Dark Matter

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The rotation curves of spiral galaxies exhibit a diversity that has been difficult to understand in the cold dark matter (CDM) paradigm. In this talk, I will show that the self-interacting dark matter (SIDM) model provides excellent fits to the rotation curves of a sample of galaxies with asymptotic velocities in the 25 to 300 km/s range that exemplify the full range of diversity. We only assume the halo concentration-mass relation predicted by the CDM model and a fixed value of the self-interaction cross section. The impact of the baryons on the SIDM halo profile and the scatter from the assembly history of halos as encoded in the concentration-mass relation can explain the diverse rotation curves of spiral galaxies. I will also discuss other smoking-gun signatures of SIDM in astrophysical observations.

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