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Constraining Dissipative Dark Matter Self-Interactions

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Dark sector models with light or massless mediators naturally introduce elastic and dissipative self-interactions of dark matter. The heat exchange induced by the elastic scattering permits the gravothermal evolution of the halo. Through the evolution, a halo with a cuspy inner density profile develops a core first but become cuspy again at late time. We find that a mild dissipative scattering can significantly accelerate this evolution process. Constraints on the dissipative scattering cross section and the dissipated energy per collision can be inferred from the density cores of dwarf galaxies with low baryonic contents.

Primary author: ZHONG, Yiming (Stony Brook University)

Co-authors: MCDERMOTT, Samuel; YU, Hai-Bo (University of California, Riverside); ESSIG, Rouven

Presenter: ZHONG, Yiming (Stony Brook University)

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