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Cooling self-interacting dark matter halos

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Dark sector models with light or massless mediators naturally introduce elastic and inelastic 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 density profile develops a core first but ultimately collapses to a cuspy density profile. We find that a mild inelastic scattering can significantly accelerate this evolution process. Constraints on the inelastic 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 (Boston University)

Presenter: ZHONG, Yiming (Boston University)

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