

Probing dark matter self-interactions in the sky

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Although the existence of dark matter is well established, its nature remains elusive. Dark matter could be part of the “dark sectors,” comprising hidden particles with new interactions. Such interactions could cause dark matter to self-interact, altering the formation and evolution of dark matter halos. Self-interacting dark matter halo undergoes gravothermal evolution, where the central halo first forms a core that ultimately collapses. The resulting cored and collapsed phases diversify the density profiles of dark matter halos. In particular, the ultra-dense substructures produced in the collapsed phase can be effectively probed by gravitational lensing. Furthermore, collapsed halos may seed the high-redshift supermassive black holes, addressing a longstanding puzzle in astrophysics.

Collaboration you are representing

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