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Self-interacting Dark Matter

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Dark matter self-interactions have important implications for the distributions of dark matter in the Universe, from dwarf galaxies to galaxy clusters. In this talk, we present benchmark models that illustrate characteristic features of dark matter that is self-interacting through a new light mediator. These models have self-interactions large enough to change dark matter densities in the centers of galaxies in accord with observations, while remaining compatible with large-scale structure data and all astrophysical observations such as halo shapes and the Bullet Cluster. These observations favor a mediator mass in the 1–100 MeV range and large regions of this parameter space are accessible to direct detection experiments like LUX, SuperCDMS, and XENON1T.

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