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# Constraining self-interacting scalar field dark matter with strong gravitational lensing?

*Wednesday 9 July 2025 08:30 (17 minutes)*

We present a method to investigate the properties of solitonic cores in the Thomas-Fermi regime within the self-interacting scalar field dark matter (SI-SFDM) framework. Using semi-analytical techniques, we characterize soliton signatures through their density profiles, gravitational lensing deflection angles, and the excess of surface mass density in the context of strong lensing by galaxy clusters. Our analysis establishes an upper-bound for the the soliton core mass, testing the self-interaction parameter space of scalar field dark matter.

In addition, we investigate the impact of baryonic matter on SI-SFDM density profiles using analytical tools, modeling how the gravitational potential of the baryonic component compresses the surrounding dark matter distribution. We discuss whether this baryon-induced compression can mimic the lensing signal of a solitonic core or introduce degeneracies with cold dark matter (CDM) cusps in the interpretation of dark matter profiles.

## Secondary track

T01 - Astroparticles, Gravitation and Cosmology

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