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Self-interacting dark matter and cosmology of a light scalar mediator

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We consider a fermionic dark matter candidate interacting via a scalar mediator coupled with the Standard Model through a Higgs portal. Motivated by the core-cusp problem, we study dark matter self-interactions which lead us to the region of the parameter space where the scalar mediator is light. We illustrate the relevant features for dark matter abundance, direct search limits and collider constraints, and find out that the coupling of the scalar mediator to the Higgs boson has to be very small. Finally we show how the problems of a light scalar mediator in the early universe can be resolved.

Primary author: Mr VASKONEN, Ville (University of Jyväskylä)

Co-authors: Prof. KAINULAINEN, Kimmo (University of Jyväskylä); Dr TUOMINEN, Kimmo (University of Helsinki)

Presenter: Mr VASKONEN, Ville (University of Jyväskylä)

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