

# Astrophysical Simulations of Frequent Self-Interactions

*Wednesday 25 March 2020 19:05 (1 minute)*

Self-interacting dark matter (SIDM) is promising to solve or at least mitigate small-scale problems of cold dark matter. Simulations have proven to be a powerful tool to study SIDM within the astrophysical context. However, it turned out to be difficult to model all dark matter models with high fidelity. Models with a differential cross-section very pointed into the forward direction, for example, light mediator models, are challenging to model numerically. We develop a novel numerical scheme that is capable of modeling this small-angle scattering faithfully within the N-body method. Therefore, we introduce a drag force as an effective description of the frequent scattering. Besides, we demonstrate that we accurately model frequent scattering. In the future, we aim to combine our scheme with the widely used Monte-Carlo approach for rare scattering to be capable of simulating light mediator models within the astrophysical context with unprecedented accuracy.

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**Session Classification:** RECEPTION and POSTER SESSION IN THE SAME ROOM

**Track Classification:** Dark matter and structure in the Universe