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Sommerfeld-Enhanced J-Factors For Dwarf Spheroidal Galaxies

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For models in which dark matter annihilation is Sommerfeld-enhanced, the annihilation cross section increases at low relative velocities.

Dwarf spheroidal galaxies (dSphs) have low characteristic dark matter particle velocities and are thus ideal candidates to study such models.

We model the dark matter phase space of dSphs as isotropic and spherically-symmetric and determine the J-factors for several of the most important targets for indirect dark matter searches.

For Navarro-Frenk-White density profiles, we quantify the scatter in the J-factor arising from the astrophysical uncertainty in the dark matter potential.

We show that, in Sommerfeld-enhanced models, the ordering of the most promising dSphs may be different relative to the standard case of velocity-independent cross sections.

This result can have important implications for derived upper limits on the annihilation cross section, or on possible signals, from dSphs.

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