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Neutrino and Gamma Ray Annihilation Signatures From Inelastic Dark Matter Around Neutron Stars

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This study investigates the capture and thermalization of inelastic dark matter outside neutron stars. While the possibility of capture, thermalization and annihilation has been studied in some detail in the literature, this has assumed dark matter thermalizes to a trajectory lying inside neutron stars. I will show that some inelastic dark matter models imply thermalization timescales long enough that a substantial fraction of dark matter annihilation can occur outside the star, resulting in potentially observable signatures in the form of neutrinos or gamma rays.
The analysis is carried out for a distribution of neutron stars and dark matter densities in the Milky Way, showing that for a few cases, current ground-based neutrino telescopes could be used to detect such signals.

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