

# Dark Ghosts - 3rd GNN Workshop on Indirect Dark Matter Searches with Neutrino Telescopes



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## Dark Matter Decay and Annihilation to Neutrinos

Dark matter particles are predicted to decay or annihilate into Standard Model particles which would produce signals of neutrinos, gamma-rays, and other secondary particles. As no such signal has yet been detected, we turn to the least constrained channel where neutrinos provide an avenue to probe astrophysical sources of dark matter particles. We review the decay and annihilation of dark matter into neutrinos over a range of dark matter masses from  $\text{MeV}/c^2$  to  $\text{TeV}/c^2$ . We examine the expected contributions to the neutrino flux at current and upcoming neutrino and gamma-ray experiments, such as Hyper-Kamiokande, DUNE, CTA, TAMBO, and IceCube Gen-2. We consider galactic and extragalactic signals of s, p, and d-wave annihilation and decay processes into neutrino pairs, yielding constraints on the dark matter self-annihilation cross-section to neutrinos  $\langle\sigma v\rangle$  and dark matter decay lifetime  $\tau$ .

**Primary authors:** ARGÜELLES-DELGADO, Carlos A. (Harvard University); DELGADO LOPEZ, Diyaselis (Harvard University (US))

**Presenter:** DELGADO LOPEZ, Diyaselis (Harvard University (US))