



PhD Summer School on Neutrinos

**Here, There & Everywhere**

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## Dark Matter decay to neutrinos

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Dark matter (DM) particles are predicted to decay into Standard Model particles which would produce signals of neutrinos, gamma-rays, and other secondary particles. Neutrinos provide an avenue to probe astrophysical sources of DM particles. We review the decay of dark matter into neutrinos over a range of dark matter masses from MeV/c<sup>2</sup> to ZeV/c<sup>2</sup>. 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 decay processes into neutrino pairs, yielding constraints on the dark matter decay lifetime that ranges from  $\tau \sim 1.2 \times 10^{21}$  s at 10 MeV/c<sup>2</sup> to  $1.5 \times 10^{29}$  s at 1 PeV/c<sup>2</sup>.

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