

# Center for Neutrino Physics Seminar

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**Gamma-ray Constraints on Decaying Dark Matter and Implications for  
Ice Cube**

Wednesday, Feb. 22, 2017

4:00pm—5:00pm

304 Robeson Hall

Utilizing the Fermi measurement of the gamma-ray spectrum toward the Galactic Center, we derive some of the strongest constraints to date on the dark matter (DM) lifetime in the mass range from hundreds of MeV to above an EeV. Our profile-likelihood based analysis relies on 413 weeks of Fermi Pass 8 data from 200 MeV to 2 TeV, along with up-to-date models for diffuse gamma-ray emission within the Milky Way. We model Galactic and extragalactic DM decay and include contributions to the DM-induced gamma-ray flux resulting from both primary emission and inverse-Compton scattering of primary electrons and positrons. For the extragalactic flux, we also calculate the spectrum associated with cascades of high-energy gamma-rays scattering off of the cosmic background radiation. We argue that a decaying DM interpretation for the 10 TeV-1 PeV neutrino flux observed by Ice Cube is disfavored by our constraints. We interpret the results in terms of individual final states and in the context of simplified scenarios such as a hidden-sector glue ball model.