Contribution ID: **27** Type: **not specified**

Shedding Light on the KM3NeT Event: A Dark Matter Effect

Saturday 15 November 2025 09:00 (18 minutes)

The recent KM3NeT observation of an $calO(100\ \mathrm{PeV})$ event KM3-230213A is puzzling because IceCube with much larger effective area times exposure has not found any such events. We propose a novel solution to this conundrum in terms of dark matter (DM) scattering in the Earth's crust. We show that intermediate dark-sector particles that decay into muons are copiously produced when high-energy ($\sim$ 100 PeV) DM propagates through a sufficient amount of Earth overburden. The same interactions responsible for DM scattering in Earth also source the boosted DM flux from a high-luminosity blazar. We address the non-observation of similar events at IceCube via two examples of weakly coupled long-lived dark sector scenarios that satisfy all existing constraints. We calculate the corresponding dark sector cross sections, lifetimes and blazar luminosities required to yield one event at KM3NeT, and also predict the number of IceCube events for these parameters that can be tested very soon. Our proposed DM explanation of the event can also be distinguished from a neutrino-induced event in future high-energy neutrino flavor analyses, large-scale DM direct detection experiments, as well as at future colliders.

Authors: VERMA, Ankur; KARTHIKEYAN, Aparajitha (Department of Physics and Astronomy, Texas A&M University); Prof. DUTTA, Bhaskar; DEV, Bhupal (Washington University in St. Louis); STRIGARI, Louis (Texas A&M); MAITRA, Writasree (Department of Physics, Washington University in St. Louis)

Presenter: VERMA, Ankur

Session Classification: Dark Matter