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Can KM3-230213A be dark matter?

Wednesday 27 August 2025 18:00 (2 hours)

We explore for the first time the possibility that the recently detected ultra-high-energy neutrino event with an energy of 220 PeV, observed by the KM3NeT experiment, originates from the decay of heavy dark matter (DM). As a representative example, we consider a scenario where the DM is a heavy right-handed neutrino (RHN). We demonstrate that a DM mass of 440 PeV can account for the observed neutrino flux. The DM lifetime required to match the best-fit flux value approaches the current constraints from gamma-ray observations. Given the large uncertainty in the flux measurement, the KM3NeT event can be explained by RHN DM decay at the 3 σ confidence level, while remaining consistent with gamma-ray limits and the absence of similar detections by IceCube.

Collaboration you are representing

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