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Heavy decaying dark matter at future neutrino radio telescopes

In the next decade, ultra-high-energy neutrinos in the EeV-ZeV energy range will be potentially detected by next-generation neutrino telescopes. Although their primary goals are to observe cosmogenic neutrinos and to gain insight into extreme astrophysical environments, they have the great potential of indirectly probing the nature of dark matter. In this talk, we study the projected sensitivity of up-coming radio neutrino telescopes, such as RNO-G, GRAND and IceCube-gen2 radio array, to decaying dark matter scenarios. We investigate different dark matter decaying channels and masses, from 10^7 to 10^{15} GeV. By assuming the observation of cosmogenic or newborn pulsar neutrinos, we forecast conservative constraints on the lifetime of heavy dark matter particles. We find that these limits are competitive with and highly complementary to previous multi-messenger analyses.

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