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Search for Decaying Dark Matter in Galaxy Clusters and Galaxies with IceCube

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The inferred abundance of dark matter in the Universe could be explained with heavy decaying dark matter. According to heavy dark matter models, the decay of dark matter in astronomical objects can produce highly energetic neutrinos detectable at the Earth. The IceCube Neutrino Observatory, located at the geographic South Pole, is to date the world's largest neutrino telescope. Over the past decade, a large amount of high-energy astrophysical neutrino events were observed with this detector, allowing us to test the heavy decaying dark matter hypotheses. We search IceCube data for neutrinos from dark matter decay in galaxy clusters, dwarf satellite galaxies of the Milky Way, and the Andromeda galaxy. The analysis uses a 9-year sample of upward-going track events. Sensitivities obtained with our analysis are compared for individual sources in the northern sky and stacked multiple targets. We focus on heavy dark matter with masses between 10 TeV and 10 PeV, decaying into a pair of Standard Model particles. The analysis covers energies around 10 TeV where multiple theoretical works have claimed inclusion of dark matter contribution would improve fits of the diffuse astrophysical neutrino spectrum.

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