



Contribution ID: 135

Type: **not specified**

First neutrino telescope dedicated search for DM induced neutrino lines

Friday 5 May 2023 14:30 (20 minutes)

Dark Matter particles in the Galactic Center and halo can annihilate or decay into a pair of neutrinos producing a monochromatic flux of neutrinos. The spectral feature of this signal is unique and it is not expected from any astrophysical production mechanism. Its observation would constitute a dark matter smoking gun signal. We performed the first dedicated search with a neutrino telescope for such signal, by looking at both the angular and energy information of the neutrino events. To this end, a total of five years of IceCube's DeepCore data has been used to test dark matter masses ranging from 10^7 GeV to 40^7 TeV. No significant neutrino excess was found and upper limits on the annihilation cross section, as well as lower limits on the dark matter lifetime, were set. The limits reached are of the order of 10^{-24} cm³/s for an annihilation and up to 10^{27} seconds for decaying Dark Matter. Using the same data sample we also derive limits for dark matter annihilation or decay into a pair of Standard Model charged particles.

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Session Classification: Astrophysical messengers of fundamental physics: Contributed talks