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Dark matter searches with the KM3NeT telescope

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KM3NeT is an underwater neutrino telescope located at two sites in the Mediterranean sea. Neutrinos are indirectly detected from the products of their interactions, which produce Cherenkov radiation. The ORCA detector, off the coast of Toulon, is designed to measure atmospheric neutrino oscillations, and the ARCA detector, off the coast of Sicily, is designed to search for neutrinos from astrophysical sources. In tandem with the primary scientific goals of both detectors, observations also allow to address other major questions, like the indirect search for dark matter.

Different cosmological observations require the introduction of dark matter as the dominant matter component of the Universe, while vaguely constraining its nature. Many models could explain its nature; from modified gravity theories, to different dark matter particle theories. WIMPs (Weakly Interacting Massive Particles) constitute one of the possible particle dark matter theories. They not only emerge naturally in many extensions of the Standard Model and have the correct cosmological properties, but they also have many and diverse implications for observable phenomena. The main observable for neutrino telescopes is the neutrino flux created either directly by the annihilation of dark matter particles, or by the decay or interaction of the products of their annihilation.

In this contribution, the capability of the KM3NeT neutrino telescope to contribute to the long-standing question of the nature of dark matter will be discussed. Limits and sensitivities to the WIMP dark matter thermally-averaged annihilation cross-section will be presented, searching for a neutrino signal created by dark matter annihilations. The search focuses on annihilation signals coming from the Galactic Centre and the Sun, where an over-density of dark matter is believed to be present, exploring dark matter masses in the range of 1 GeV to 100 TeV.

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