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Search for dark matter induced neutrinos with the Super-Kamiokande detector

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Indirect searches for dark matter are performed based on atmospheric neutrino data collected with the Super-Kamiokande (SK) detector in years 1996-2016. The excess of neutrinos from possible dark matter sources such as Sun, Earth and Galactic Center, compared to the expected atmospheric neutrino background is searched. Angular distributions and energy spectra as expected for signal and background are taken into account and various dark matter annihilation channels are considered. All event samples (fully-contained, partially-contained along with upward-going muons), including both electron and muon neutrinos, covering a wide range of neutrino energies (GeV to TeV) are used. The allowed number of dark matter induced neutrinos which can be contained in SK data so far is estimated. Obtained limits on dark matter induced neutrino flux are related to the limit on spin-dependent (for the Sun) and spin-independent (for the Sun and the Earth's core) WIMP-nucleon scattering cross section and compared against the results of direct detection experiments. In case of the Galactic Center analysis, the upper limit on the dark matter self-annihilation cross-section is derived.

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