

Dark matter searches at Super-Kamiokande

Thursday 27 July 2017 15:30 (15 minutes)

This work presents indirect searches for dark matter (DM) as WIMPs (Weakly Interacting Massive Particles) using atmospheric neutrino data of Super-Kamiokande-I,-II,-III and -IV (1996-2016). The latest results of the search for WIMP-induced neutrinos from the Sun, the Earth's core and the Milky Way are discussed.

We search for an excess of neutrinos as compared to the expected level of atmospheric neutrino background using a fit method. The fit is based on angular and momentum distributions of simulated background and various signal hypotheses of DM-induced neutrinos. It includes all event samples of fully-contained, partially-contained and upward-going muons. This allowed us to test wide range of WIMP masses spanning in maximum from 1 GeV up to 10 TeV, varying and depending on WIMP annihilation source and assumed annihilation channel. Super-Kamiokande sensitivity for masses of DM particles in the GeV scale is the best among neutrino experiments. In case of Solar/Earth WIMP search, obtained limit on DM-induced neutrino flux was related to limit on spin-dependent (Solar/Earth) and spin-independent (Solar) WIMP-nucleon cross section and compared against results of direct detection experiments. In case of Milky Way analysis, the upper limits on the self-annihilation cross-section were derived.

Primary author: MIJAKOWSKI, Piotr Maciej (National Centre for Nuclear Research (PL))

Presenter: MIJAKOWSKI, Piotr Maciej (National Centre for Nuclear Research (PL))

Session Classification: Dark Matter

Track Classification: Dark Matter