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P4.013 **Dark matter searches with the Super-Kamiokande detector**

K Frankiewicz[1], P Mijakowski[1], and K Choi[2]

[1]National Centre for Nuclear Research, Poland, [2]University of Hawaii at Manoa, USA

on behalf of Super-Kamiokande collaboration

This work presents indirect search for dark matter (DM) as WIMPs (Weakly Interacting Massive Particles) based on atmospheric neutrino data collected with the Super-Kamiokande (SK) detector in years 1996-2014 (SK-I,-II,–III and -IV data taking periods). For the first time all event samples (fully-contained, partially-contained along with upward-going muons) including both electron and muon neutrinos and covering a wide range of neutrino energies (GeV to TeV) are used. This gives a unique sensitivity for low WIMP masses.

In the presented analyses we search for excess in number of neutrinos originating from the direction corresponding to position of a massive celestial body (DM induced neutrino source), compared to the atmospheric neutrino background. Neutrinos provide very good information on their source position while traversing unaffected through galactic scales. Moreover, their energy remains unchanged during propagation, providing valuable information on energy spectra generated in DM annihilation processes. Possible sources of DM concentration such as the Sun, the Earth's core and the Milky Way are considered.

Analysis method is based on detailed simulation of signal (neutrinos from DM annihilation) and background (atmospheric neutrinos) for the SK detector. Angular distributions and energy spectra as expected for signal and background are taken into account. Various DM annihilation channels and wide range of relic particle masses are considered. Global fit of a simulated signal and background to the data is performed and allowed number of DM induced neutrinos which can be contained in SK data so far is estimated. Obtained limits on DM induced neutrino flux are related to limit on spin-dependent (for the Sun) and spin-independent (for the Sun and the Earth's core) WIMP-nucleon cross section and compared against results of direct detection experiments. In case of Milky Way analysis, the upper limit on the self-annihilation cross-section is derived as a function of WIMP mass.