

Search for light WIMP captured in the Sun using contained events in Super-Kamiokande

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Super-Kamiokande can search for dark matter by detecting neutrinos and muons which are produced by WIMP pair annihilations occur inside the Sun. The huge gravity and hydrogen-rich composition of the Sun combined with high sensitivity of Super-Kamiokande for low-energy (few GeV) neutrinos allow us good sensitivity to light (few GeV to few 10 GeV) WIMP dark matter, especially for spin-dependent coupling case. In this analysis, we increased signal acceptance by using fully-contained and partially-contained neutrino events added to up-going muons in Super-Kamiokande. We also used minimum χ^2 method to use energy, direction and flavor information. We fitted Super-Kamiokande I-IV data to find the allowed contribution of WIMP-induced neutrino events added to large background of atmospheric neutrino events. As a result, we found no signal observed and the null result was interpreted as upper limit on the spin-dependent (SD) WIMP-nucleon elastic scattering cross-section for $\chi\chi \rightarrow b\bar{b}$ and $\chi\chi \rightarrow \tau^+\tau^-$ WIMP annihilation channels. We set current best limit on SD WIMP-proton cross-section for WIMP mass below 100 GeV.

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