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Detecting electron neutrinos from solar dark matter annihilation by JUNO

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We explore the electron neutrino signals from light dark matter (DM) annihilation in the Sun for the large liquid scintillator detector JUNO. In terms of the spectrum features of three typical DM annihilation channels $\chi\chi \to \nu\bar{\nu}, \tau^+\tau^-, b\bar{b}$, we take two sets of selection conditions to calculate the expected signals and atmospheric neutrino backgrounds based on the Monte Carlo simulation data. Then the JUNO sensitivities to the spin independent DM-nucleon and spin dependent DM-proton cross sections are presented. It is found that the JUNO projected sensitivities are much better than the current spin dependent direct detection experimental limits for the $\nu\bar{\nu}$ and $\tau^+\tau^-$ channels. In the spin independent case, the JUNO will give the better sensitivity to the DM-nucleon cross section than the LUX and CDMSlite limits for the $\nu\bar{\nu}$ channel with the DM mass lighter than 6.5 GeV. If the $\nu\bar{\nu}$ or $\tau^+\tau^-$ channel is dominant, the future JUNO results are very helpful for us to understand the tension between the DAMA annual modulation signal and other direct detection exclusions.

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