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## Neutrinos as signal and background in the search for dark matter with INO

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Annihilation of Weakly Interacting Massive Particles (WIMPs) in the center of the sun( $\odot$ ), earth( $\oplus$ ) and the galaxy can give rise to neutrino-antineutrino pairs as their final products. We look at the prospects of detecting such neutrinos at the proposed 50-kt Iron Calorimeter (ICAL) detector, to be housed at the upcoming India-Based Neutrino Observatory (INO), wherein the interaction of neutrinos ( $\nu_\mu/\bar{\nu}_\mu$ ) with detector iron layers will produce  $\mu^-/\mu^+$ . The atmospheric neutrinos in GeV range will pose a serious background to such signal neutrinos, which fortunately, can be suppressed considerably by exploiting the excellent angular resolution of the ICAL detector. The expected sensitivity limits for 500 kt-years of ICAL exposure are quite competitive to other neutrino experiments for the WIMP masses  $m_\chi < 100$  GeV. The expected 90 % C.L. exclusion sensitivity limits for 500 kt-years exposure for  $\tau^+\tau^-$  channel (100 % branching ratio) for WIMP-nucleon Spin Dependent ( $\sigma_{SD}$ ) and Spin Independent ( $\sigma_{SI}$ ) cross-section are found to be  $\sigma_{SD,\odot} < 6.87 \times 10^{-41} \text{ cm}^2$  and  $\sigma_{SI,\odot} < 7.75 \times 10^{-43} \text{ cm}^2$  for the WIMP mass ( $m_\chi$ ) = 25 GeV, and  $\sigma_{SI,\oplus} = 1.02 \times 10^{-44} \text{ cm}^2$  for  $m_\chi = 52.14$  GeV. For galactic centre searches, the expected 90 % C.L. sensitivity limits on velocity averaged annihilation cross-section  $\langle \sigma_A v \rangle$  for a 30 GeV WIMP, assuming NFW WIMP profile and 100% branching ratio for each channel are:  $\langle \sigma_A v \rangle \leq 1.19 \times 10^{-22} \text{ cm}^3 \text{ s}^{-1}$  for the  $\mu^+\mu^-$  channel and  $\langle \sigma_A v \rangle \leq 6.35 \times 10^{-23} \text{ cm}^3 \text{ s}^{-1}$  for the  $\nu - \bar{\nu}$  channel.

### Collaboration name

INO

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