

Search for sterile neutrinos with SOX: Monte Carlo studies of the experiment sensitivity and systematic effects

The SOX experiment aims to test the hypothesis of existence of sterile neutrinos with $\Delta m^2 \sim \text{eV}^2$ through a short baseline (distance ~ 10 m) disappearance experiment performed with the liquid scintillator detector Borexino. The SOX experiment will detect MeV-energy electron anti-neutrinos, produced by an intense source of $^{144}\text{Ce} - ^{144}\text{Pr}$ (activity between 4 PBq and 5 PBq) placed beneath the detector itself. By resolving the interaction position and the energy, an oscillated signature can be observed in case of a sterile neutrino. The SOX sensitivity under this hypothesis is predicted in a wide sterile mass range through Monte Carlo simulations. In this contribution we show studies of systematic effects related to the position reconstruction. We analyzed their importance in order to understand their impact on the total rate of events and the shape of the event distributions, and thus on the SOX exclusion power.

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