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Sensitivity to CNO cycle solar neutrinos in Borexino

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The Borexino detector, located at the Laboratori Nazionali del Gran Sasso in Italy, is a liquid scintillator detector with a primary goal to measure solar neutrinos. The sub-dominant CNO cycle in the Sun is assumed to be the main energy production mechanism in heavier stars. The existence of this fusion process in Nature has been recently confirmed by Borexino (5σ C.L.) for the first time through the detection of neutrinos from the CNO cycle in the Sun. A direct measurement of this fusion process is challenging due to the high spectral correlation with the detector background ^{210}Bi and the solar pep neutrino signal. In order to prove the sensitivity to CNO neutrinos, a dedicated toy Monte Carlo procedure is needed to evaluate the discovery potential applying separate constraints on the ^{210}Bi and pep neutrino interaction rates. Here, the Standard Solar Model predictions for low- and high-metallicity are used as inputs for the simulation studies. In the so-called Borexino Phase-III, namely the data-taking period from July 2016 to February 2020, the sensitivity is compatible with the significance observed on data. In this talk, the Borexino sensitivity study to CNO neutrinos is presented.

Collaboration name

Borexino

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