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Analytical Multivariate Fit and Sensitivity Studies in the Borexino Solar Neutrino Analysis

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 spectral fit of the energy spectrum has been performed for the first time in the whole energy range from 0.19 up to 2.93 MeV. This approach made it possible to obtain the fluxes of 7Be, pp, and pep solar neutrinos simultaneously. To increase the sensitivity for pep and CNO neutrinos, the multivariate fit technique has been developed, which takes into account additional information of the radial and pulse shape distributions of events. The current limit on CNO neutrinos was obtained by fixing the theoretically well-known ratio of the expected rates between pp and pep neutrinos, as obtained from the standard solar models. In addition to this approach, sensitivity to CNO neutrinos using other methods are under study. The talk shows the analytical multivariate fitting strategy used to obtain the new Borexino results for the 7Be, pp, and pep rates and the sensitivity of the Borexino detector to measure CNO neutrinos. This talk is presented in the name of the Borexino Collaboration.

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