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Analytical response function for the Borexino solar neutrino analysis

Borexino experiment is located at the Laboratori Nazionali del Gran Sasso (LNGS) in Italy, and its primary goal is detecting solar neutrinos, in particular those below 2 MeV, with unprecedentedly high sensitivity. Its technical distinctive feature is the ultra-low radioactive background of the inner scintillating core, which is the basis of the outstanding achievements obtained by the experiment (fluxes of ^{7}Be, pep, pp, and limit on CNO).

A spectral fit in the whole energy range from ˜200 keV up to ˜2 MeV has been performed for the first time, allowing to obtain simultaneously fluxes of all the solar neutrino components. To make such a fit possible, one requires the exact shapes of neutrino signals and backgrounds, as seen in the detector. Therefore, the transformation of the spectra from the original energy scale to the scale of the desired energy estimator, such as the number of hit PMTs or photoelectrons, is one of the key steps of the analysis. This conversion accounts for the energy scale non-linearity and the detector's energy response, and can be performed using two approaches: the Monte Carlo simulation and the use of analytical models. The details and advantages of the analytical approach will be presented in this poster.

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