Borexino: Geo-Neutrino measurement at Gran Sasso, Italy

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Introduction

Borexino is a massive, calorimetric liquid scintillator detector installed at the Gran Sasso Laboratory in central Italy. Designed with solar neutrinos as main target, its experimental features are also perfectly suited for geo-neutrino investigation.

General outline of the talk

As it is customary in a liquid scintillator experiment, Borexino detects anti-neutrino through the classical Inverse Beta Decay reaction a la Cowan-Reines. The specificity of the reaction tag, the rock overburden amounting to 3800 meter of water equivalent, the ultra-low background achieved in the liquid scintillator, the distance from the European nuclear power reactors, are all factors which make Borexino an ideal environment for a very clean geo-neutrino measurement, despite the handful number of expected events.

Indeed Borexino, with five years of accumulated data, has collected with unambiguous evidence a crystal clear geo-neutrino signal with a statistical significance of 4.5 sigma. Besides proving the possibility to detect geo-neutrinos rather effectively, the quality of the data is such that some data-model comparison can be already attempted, despite the low statistics of the measurement.

In this talk I will briefly review the characteristics that make Borexino a unique detector, especially for what concerns the outstanding and unprecedented radiopurity achieved in the scintillating core of the experiment, and then I will describe with some details the features of the geo-neutrino measurement performed so far.