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Results and physics implications of the precision measurement of the 7Be solar neutrino flux performed with the Borexino detector

vendredi 22 juillet 2011 14:30 (15 minutes)

Borexino is a massive, calorimetric liquid scintillator detector installed at the underground Gran Sasso Laboratory. With its unprecedented radiopurity levels achieved in the core of the detection medium, it is the only real time experiment in operation able to study solar neutrino interactions in the challenging sub-MeV energy region.
The recent precise measurement of the 7Be solar neutrino flux, characterized by a total uncertainty amounting to less than 5 %, will be described, as well as the accurate determination of the corresponding day/night asymmetry.
These results, besides constituting the most precise experimental evaluations concerning low energy solar neutrinos obtained to date, provide also a unique opportunity to probe and validate the favored neutrino oscillation paradigm in the so far untested Vacuum regime. Furthermore, they have also important implications in term of allowed regions in the oscillation parameters space.
Other very interesting outcomes of the experiment, specifically the low threshold investigation of 8B solar neutrinos and the detection of geo-neutrinos from the Earth, will be summarized, too.
Finally, the potential physics reach of a neutrino/anti-neutrino source measurement in Borexino will be highlighted, with special emphasis to its impact in the current experimental scenario characterized by several intriguing hints of possible short baseline oscillations involving eV scale sterile neutrinos.

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