



Contribution ID: 8

Type: **Presentazione 20 minuti**

Looking at the Sun's core. CNO and pep solar neutrino detection in Borexino.

Friday, 13 April 2012 09:10 (20 minutes)

Both the first evidences and the first discoveries of neutrino flavor transformation have come from experiments which detected neutrinos from the Sun. Observation of solar neutrinos directly addresses the theory of stellar structure and evolution, which is the basis of the standard solar models (SSMs). The Sun as a well-defined neutrino source also provides extremely important opportunities to investigate nontrivial neutrino properties such as neutrino oscillations and MSW effect, because of the wide range of matter density and the great distance from the Sun to the Earth. The ultra-pure Borexino detector at Laboratori Nazionali del Gran Sasso is designed to perform low energy solar neutrino spectroscopy. Recently, the Borexino experiment has obtained the first direct evidence of the rare proton-electron-proton (pep) fusion reaction in the Sun by the detection of the neutrinos emitted in the process. Borexino has also placed the strongest limit on the flux of the neutrinos emitted in the carbon-nitrogen-oxygen (CNO) cycle. In this seminar, after an introduction to solar neutrinos phenomenology and experiments, I will summarize the novel techniques adopted in Borexino to reduce the cosmogenic and external background contributions and I will describe the physics results obtained.

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