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New Solar 7Be rate and day night effect measurements in Borexino

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Two new experimental data about solar 7Be neutrinos have been released in the middle April 2011 by the Borexino collaboration: the new high precision interaction rate and the absence of the day night effect. The two results will be discussed together with their physical consequences about low energy neutrino oscillations.

Summary

A direct measurement of the 0.862 MeV 7Be solar neutrino interaction rate performed with the Borexino detector at the Laboratori Nazionali del Gran Sasso yields 46.0 +-1.5stat +1.6-1.5 syst counts/(day100 ton). This result is the first direct measurement of a sub-MeV solar neutrino rate with an accuracy better than 5%. The hypothesis of no oscillation for 7Be solar neutrinos is rejected at 4.9 % C.L. Using the latest Standard Solar Model (SSM) flux predictions, the
result leads directly to a precise determination of the survival probability for solar neutrino in vacuum, and permits to probe with unprecedented sensitivity the transition between the matter-enhanced and vacuum-dominated neutrino

I will in addition report on a search for the day-night asymmetry of the 7Be solar neutrino rate measured by Borexino at the Laboratori Nazionali del Gran Sasso (LNGS), Italy. The measured value, Adn = 0.001 +- 0.012 (stat) +- 0.007 (syst), shows the absence of a significant asymmetry. This result alone rejects the so-called LOW solution at more than 8.5 sigma. Combined with the other solar neutrino data, it isolates the Large Mixing Angle LMA-MSW solution at chi2 > 190 without relying on the assumption of CPT symmetry in the neutrino sector. We also show that including the day-night asymmetry, data from Borexino alone restricts the MSW neutrino oscillations to the LMA solution at 90% CL.

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