

LABORATORI NAZIONALI DEL GRAN SASSO

SEMINAR ANNOUNCEMENT

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***Measurement of
geo–neutrinos with
Borexino during 1353
days of live time***

We present a measurement of the geo–neutrino signal obtained with the Borexino detector at Laboratori Nazionali del Gran Sasso in Italy. With a fiducial exposure of $(3.69 \pm 0.16) \times 10^{31}$ proton \times year after all selection cuts and background subtraction, we detected (14.3 ± 4.4) geo–neutrino events with a fixed chondritic mass Th/U ratio of 3.9. This corresponds to a geo–neutrino signal $S_{\text{geo}} = (38.8 \pm 12.0)$ TNU. From the $\ln L$ profile, the null geo–neutrino measurement has a probability of 6×10^{-6} . If the U and Th components are fitted individually, the relative signals are $S_{\text{Th}} = (10.6 \pm 12.7)$ TNU and $S_{\text{U}} = (26.5 \pm 19.5)$ TNU. Borexino data alone are compatible with a mantle geo–neutrino signal of (15.4 ± 12.3) TNU, while a combined analysis with the KamLAND data allows to extract a mantle signal of (14.1 ± 8.1) TNU. Borexino data reject the hypothesis of an active geo–reactor in the Earth's core with a power above 4.5 TW at 95% C.L. Our measurement of a reactor anti–neutrino signal $S = 84.5^{+19.3}_{-18.9}$ TNU is in agreement with expectations in the presence of neutrino oscillations.

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