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First significant measurement of the Earth's orbital parameters with solar neutrinos in Borexino

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Since the beginning of 2012, the Borexino collaboration has been reporting precision measurements of the solar neutrino fluxes emitted in the proton–proton chain and in the Carbon-Nitrogen-Oxygen cycle. The solar neutrino interaction rate time series exhibits the annual sinusoidal modulation due to the Earth's elliptical orbit. Other modulations could point to neutrino physics beyond the Standard Model. Using Borexino Phase-II and Phase-III data, we search for signals between one cycle/year and one cycle/day. Using a frequency analysis performed with a generalized version of Lomb-Scargle periodogram (GLS) and an unconstrained sinusoidal fit, we are sensitive to the ellipticity of the Earth's orbit at more than 5σ significance using solar neutrinos only and we exclude other significant sinusoidal signal in the Borexino time series other than the annual modulation.

In-person participation

No

Primary author: BIONDI, Riccardo (Istituto Nazionale di Fisica Nucleare)**Presenter:** BIONDI, Riccardo (Istituto Nazionale di Fisica Nucleare)**Session Classification:** Neutrino Physics**Track Classification:** Neutrino Physics