

First experimental proof of CNO fusion cycle in Sun with the Borexino Experiment

Tuesday, 21 September 2021 11:05 (35 minutes)

Borexino, an ultra-pure liquid scintillator detector located at the Laboratori Nazionali del Gran Sasso in Italy, has detected solar neutrinos from the CNO fusion cycle for the first time in history. The CNO cycle is predicted to be the dominant energy production process in massive stars, while it is a secondary mechanism for the solar energy production. Its small associated neutrino flux, as well as the similarity of the spectral shapes of electrons scattered off CNO and *pep* solar neutrinos and electrons from the decays of ^{210}Bi background, make measurement of CNO solar neutrinos very challenging. The proof of the existence of CNO fusion process in Nature has been made possible by carrying out several campaigns of purification of Borexino liquid scintillator and in 2016, thermal stabilization of the detector. This talk, on the behalf of the Borexino collaboration, will present the overview of the challenges along with their solutions adopted to extract the CNO solar neutrino signal with the rejection of the null hypothesis with greater than 5sigma significance at 99% C.L as well as the implications of this result for solar physics.

Primary author: Ms SINGHAL, Apeksha (Forschungszentrum Jülich - IKP-2)

Co-author: ON THE BEHALF OF BOREXINO COLLABORATION

Presenter: Ms SINGHAL, Apeksha (Forschungszentrum Jülich - IKP-2)

Session Classification: Plenary

Track Classification: Section 5. Neutrino physics and astrophysics.