Contribution ID: **330** Type: **Poster**

Feasibility study for 7Be and CNO solar neutrino directional measurement with JUNO

Friday, 21 June 2024 17:30 (2 hours)

JUNO (Jiangmen Underground Neutrino Observatory) is a multipurpose neutrino physics experiment currently under construction in China. Its central detector consists of an acrylic sphere, filled with 20 kton of organic liquid scintillator, and a stainless steel structure, built to sustain 43212 photomultiplier tubes (PMTs) around the sphere. Thanks to its unique features, such as its huge active mass, a great PMT geometrical coverage and a complex strategy for the radioactivity control of all its components, JUNO is a perfect candidate to study solar neutrinos. Solar neutrinos mainly interact through elastic scattering reactions with liquid scintillator electrons. Hence, due to the absence of multiple events in temporal coincidence, all the decays of unstable nuclei will be backgrounds.
Two different techniques can be adopted to statistically separate solar neutrino events from background ones: the spectral analysis, which exploits the different energy spectral shapes of signals and backgrounds; and the Correlated and Integrated Directionality (CID) analysis, recently developed by the Borexino collaboration. CID relies on the directionality of the Cherenkov light: in solar neutrino events, the PMT hits caused by Cherenkov photons exhibit a correlation with the Sun's position. The Cherenkov light is sub-dominant in JUNO (<1% of the total detected photons), however, thanks to its instant emission, the early PMT hits retain the directional information. Contrarily, for background events, no PMT hit shows any correlation with the Sun's position.
Our preliminary studies show that the application of CID is feasible in JUNO. In this contribution, the CID technique will be introduced and its application for the measurement of 7Be and CNO neutrinos in JUNO will be presented. Finally, the strategy to combine the spectral and the CID analyses will be shown: the combination might improve JUNO's sensitivity to 7Be and CNO solar neutrinos.

Poster prize

Yes

Given name

Marco

Surname

Malabarba

First affiliation

GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany

Second affiliation

Forschungszentrum Jülich - Institute for Nuclear Physics, IKP-2, Jülich, Germany

Institutional email

marco.malabarba@gmail.com

Gender

Male

Collaboration (if any)

JUNO

Primary author: MALABARBA, Marco (GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany)

Presenter: MALABARBA, Marco (GSI Helmholtzzentrum für Schwerionenforschung, Darmstadt, Germany)

Session Classification: Poster session and reception 2

Track Classification: Solar neutrinos