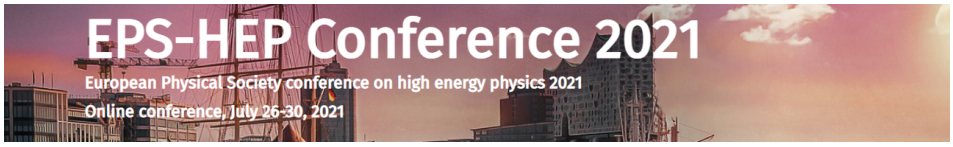

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OSIRIS –An online scintillator radiopurity monitor for the JUNO experiment

The Jiangmen Underground Neutrino Observatory (JUNO) currently under construction in China, will be the first multi-kton liquid scintillator detector and has a vast potential for new insights into several fields of neutrino and astroparticle physics. To reach its design sensitivity for detecting reactor and solar neutrinos, a radiopure liquid scintillator is required. For IBD measurements, a radiopurity of 10^{-15} g/g is needed for both ^{238}U and ^{232}Th, 10^{-16} g/g for solar measurements.

The Online Scintillator Internal Radioactivity Investigation System (OSIRIS) allows an on-line radiopurity evaluation of the scintillator during the JUNO detector filling over several months. The design of OSIRIS is optimized for tagging ^{214}Bi-^{214}Po and ^{212}Bi-^{212}Po coincidence decays in the decay chains of ^{238}U and ^{232}Th, respectively. OSIRIS will also be able to monitor the ^{14}C and ^{210}Po levels in the scintillator.

To achieve its goals, OSIRIS features a 20 ton liquid scintillator target monitored by 76 intelligent photomultiplier tubes (iPMTs). In this novel design, each iPMT consists of a PMT and its readout electronics mounted on its back. Each hit causing these electronics to trigger is sent to the DAQ as a digitized PMT pulse. A single computer (EventBuilder) is sufficient to combine the data stream into events for further analysis.

For the timing and charge calibration of the detector, two optical systems (LED- and LASER-based) are employed. The energy and position calibration of OSIRIS is performed with height-adjustable radioactive sources within the liquid scintillator. These sources cover the crucial energy range for the detection of Bi-Po signals between 0.66 MeV to 2.5 MeV.

The general design of the OSIRIS detector and its subsystems is presented in this poster.

Collaboration / Activity

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