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Calibration of the JUNO pre-detector OSIRIS

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The Jiangmen Underground Neutrino Observatory (JUNO) is a multi-purpose neutrino experiment currently under construction in Jiangmen, southwest China. Its main detector consists of a acrylic sphere of 35.4m in diameter, filled with 20kt of liquid scintillator. JUNO features a broad physics program, with the determination of the neutrino mass ordering as the primary goal. However, this goal can only be reached if a thorough background control of the experiment is carried out. Especially, the use of radiopure materials is of upmost importance to reduce neutrino-signal mimicking bismuth-polonium decays.
For the purpose of monitoring radiopurity of liquid scintillator (LS) batches during the months-long filling of JUNO, the Online Scintillator Internal Radioactivity Investigation System (OSIRIS) was developed. OSIRIS features a central, watershielded 3m x 3m acrylic vessel (AV) filled with 18 tons of LS. The AV is instrumented with an array of 76 Large Photomultiplier Tubes (LPMTs).
For the calibration of OSIRIS, two independent and partially redundant systems are employed:A picosecond Laser Calibration System utilising sub-ns single photon pulses is used for precise calibrations of LPMT timing and charge responses in the spe regime. An Automated Calibration Unit (ACU) from the Daya Bay experiment is employed for the calibration of energy and vertex reconstructions via radioactive sources. The ACU is also hosts an LED, used for redundant calibrations of LPMT timing and charge responses.
This poster will describe the calibration systems of OSIRIS, the expected performance of the two systems, simulated performance of the calibration and very first results from the commissioning of the OSIRIS detector.

Poster prize

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