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Study of SIPMs for the JUNO-TAO detector

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The Taishan Antineutrino Observatory (JUNO-TAO) is a ton-level liquid scintillator detector at 30-35 meters from the Taishan reactor and it is a satellite detector of the JUNO Observatory.
It aims to measure the reactor neutrino spectrum and to provide model independent inputs for the neutrino mass hierarchy. To reach an energy resolution better than 2%, the scintillation light produced in the liquid scintillator is detected by about 4100 Silicon photomultipliers (SIPMs) having a >50% photon detection efficiency.
SIPMs should fit several requests: a low radioactivity, less than 4.4 Bq/kg, 6.3 Bq/kg and 1 Bq/kg for Uranium, Thorium and Potassium, respectively; high and uniform photon detection efficiency; a low value of dark noise at -50 ℃, the operative temperature of the detector.
A R&D on SIPMs is in progress to find the best solution for the JUNO-TAO detector.
In this talk, an overview of the R&D will be reported with emphasis on the requirements of SIPMs and ongoing work related to their characterizations.

Collaboration name

JUNO

Primary author: LOMBARDO, Claudio (Dipartimento di fisica ed Astronomia Università degli studi di Catania)

Presenter: LOMBARDO, Claudio (Dipartimento di fisica ed Astronomia Università degli studi di Catania)

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