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Upgraded CONNIE experiment with Skipper CCDs

Tuesday 29 August 2023 17:00 (15 minutes)

The Coherent Neutrino-Nucleus Interaction Experiment (CONNIE) is located at a distance of 30 m from the core of the Angra 2 nuclear reactor in Rio de Janeiro, Brazil. Its goal is to detect the coherent elastic scattering of reactor antineutrinos, known as CEvNS, off silicon nuclei using fully depleted high-resistivity charge-coupled devices (CCDs). Running since 2016, the experiment has set upper limits on the CEvNS rate and placed stringent constraints on some scenarios beyond the Standard Model involving light mediators. Recently, the collaboration has also explored the experiment's sensitivity to other exotic scenarios such as milli-charged particles. With the purpose of further reducing the energy threshold, two Skipper CCDs were installed in the summer of 2021. The collaboration has demonstrated stable operation of the new sensors with a readout noise of 0.15 electrons and a single-electron rate of ˜0.05 e-/pix/day. New techniques have been developed to reduce the effects of instrumental backgrounds, allowing to reach a threshold of 20 eV. In this presentation, I will discuss the performance of Skipper CCDs, along with the enhanced data selection techniques employed. Additionally, I will present the preliminary results of the reactor ON-OFF low energy spectrum difference from the Skipper data. Finally, I will touch upon the future prospects for detecting CEvNS with Skipper-CCDs technology.

Submitted on behalf of a Collaboration?

Yes

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