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Optical simulation of a reactor neutrino CEvNS experiment with dual-phase argon technology

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The coherent elastic neutrino-nucleus scattering (CEvNS) process in reactor neutrino experiments has yet to be observed. We are proposing to use a dual-phase argon time projection chamber (TPC) detector with a fiducial volume of several hundred kilograms to measure the reactor neutrino CEvNS. The location of this experiment is chosen to be at the Taishan nuclear power plant in China, where the thermal power is 4.6 GW and the expected neutrino flux at a distance of 35 m from the reactor core is $6 \times 10^{12} \text{cm}^{-1} \text{s}^{-1}$.

The dominant backgrounds of this experiment are from the cosmic rays. Therefore, to optimize the size of the detector, we simulate the muon-induced responses to evaluate the live-time during the operation of this experiment. Furthermore, we perform simulations of cosmogenic isotopes and the intrinsic background of the detector using an optical model to estimate the pile-up rate of the detector.

Submitted on behalf of a Collaboration?

No

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