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Study of delayed electron background in liquid and gaseous xenon detectors

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Coherent elastic neutrino-nucleus scattering (CEνNS) signals have extremely low energy threshold, and so controlling the background in the low-energy region is crucial for the detection. RELICS is an experiment aiming to detect CEνNS signals from reactor neutrinos on the ground using a dual-phase liquid xenon time projection chamber detector. Delayed electron is one of the most significant backgrounds. In order to study its distribution pattern and generation mechanism, we analyse data form RELICS prototype. The result shows that Delayed Electrons are correlated with previous high energy events in time and position. Drift time of electrons, liquid xenon purity and extraction field will also affect Delayed Electrons emission. Based on the spatial and temporal correlation with high-energy events, a data selection method is designed, which can reduce the background event rate in the CEνNS energy region by 1 to 2 orders of magnitude.

Collaboration you are representing

RELICS

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