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Signal Clustering and Particle Tracking Using a Single Event-Driven SOI Pixel Detector for Axion Search Experiment

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The current experiment aims to establish new limits on the axion mass for the hadronic window, using 57 Fe isotopes to search for an excess of solar axions at 14.4 keV. In order to improve the current limits, we make use of an X-ray SOI pixel detector; this device offers a fine granularity, a good energy resolution and a event-driven mode in the RoI (Region of Interest), besides the conventional frame readout mode (CCD-like). Since a reduction in the background levels from radioisotopes and cosmic-rays is required, we discuss the possibility of tracking and measuring the likelihood of the signal in being produced by different background particles, making use of the detector properties. In order to do this we develop a set of algorithms, and test their effectiveness on the first group of background data obtained with the XRPIX detector.

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