

Measurement of 214-Bi beta spectrum in XENONnT

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The XENONnT experiment, situated at the INFN Laboratori Nazionali del Gran Sasso, is a dark matter direct detection experiment with a target of 5.9 tonnes of instrumented liquid xenon. While its primary goal is detecting the faint signals from dark matter particle interactions, it also enables the measurement of high-energy events originating from background radioactive isotopes, including 214-Bi from the radon decay chain. Our study presents a method to select a clean sample of events from the first forbidden non-unique beta decay of 214-Bi to the ground state of 214-Po. This analysis serves two key purposes. Firstly, it provides an internal calibration sample to characterise the detector's response to single beta decays. Secondly, it is the first measurement of the energy spectrum of this specific decay in its entire energy range. This measurement can be compared with the predictions from nuclear structure models for forbidden beta decays.

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