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High-precision alpha spectroscopy using solid-state detectors

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Single-crystal chemical vapour deposition (sCVD) diamond detectors are known for their high radiation hardness and excellent performance at elevated temperatures. Recent results have shown that silicon carbide (SiC) sensors are promising candidates for particle spectroscopy in demanding environments. In this study, we present a comparative analysis of the achievable energy resolution of sCVD and SiC detectors compared to standard silicon (Si) detectors. To do so, alpha spectroscopy is performed, a reliable technique for calibrating newly developed detectors. The measurements were conducted in a vacuum environment of 10^{-3} mbar using an unsealed ^{241}Am alpha-particle source and CIVIDEC's high-resolution data acquisition system, ROSY® AX106. The experimental results are compared to Geant4 simulations. Additionally, the impact of gold (Au) and titanium (Ti) electrodes on the achievable energy resolution is examined.

Primary experiment

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