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Four-Stage Diamond Spectrometer for Low-Energy Proton Identification

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Thin planar single-crystal chemical vapour deposition (sCVD) diamond sensors enabled the development of a multi-stage spectrometer capable of measuring low-energy protons in the range of 2 MeV to 20 MeV. In this study, a CIVIDEC B14 Diamond Telescope Detector was utilised to analyse a proton beam generated by neutron interactions with a polyethylene converter. This shows the background suppression capabilities of the spectrometer. The experimental data was compared with Geant4 simulations for a proton beam with a Gaussian energy distribution of (12.7 ± 0.5) MeV. The comparison shows an excellent agreement between the measurement and simulation, allowing for a detailed study of the proton interaction with sCVD diamond. The capabilities and limitations of the proton spectrometer will be evaluated and presented in this paper.

Primary experiment

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