

PORTABLE TRACKING DETECTOR FOR COSMIC BACKGROUND MEASUREMENTS

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The next generation of radioactive-ion beam experiments will provide more details about the reactions of stable nuclei and Big Bang Nucleosynthesis. For better understanding of these processes, more precise cross-section data are needed at low energies which require low-radiation background [1]. Due to this, experimental facilities are usually located underground. Therefore, the knowledge on the cosmic background is a key element to propose and design experiments on reactions of stable nuclei.

A portable tracking device has been developed for measurements of cosmic background with its sensitive area of 0.1 m² and weight of 15 kg [2,3,4]. The designed detector is based on the novel Close Cathode Chambers [5,6] – a cheap, easy handling, lightweight, high efficiency detector technology – able to work even at harsh conditions. The total power consumption of the complete detector system is less than 5 W. The cosmic background has been measured at an underground laboratory in Felsenkeller, Dresden, Germany. The detector reliably operated during the 40 days of measurements. The maximum flux value is found to be below 3 m⁻²s⁻¹. The results quantify the shielding of Felsenkeller tunnel system and provide a well defined baseline for the design of the proposed radioactive ion beam experiments. The portability, reliable tracking performance, low power consumption and the good angular resolution makes our detector to be a good candidate to perform such reference measurements.

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