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Calibration and testing of a beam profile monitor on the U-400 cyclotron for diagnosis of low-intensity ion beams

Thursday 5 June 2025 15:30 (2 hours)

Calibration and experimental testing of the beam profile monitor were conducted at the U-400 accelerator of the LNR JINR using a 84Kr+8 beam with an energy of 3.11 MeV/nucleon. The tests included measuring secondary emission currents from cathodes made of graphite and aluminum, installed with a 3 mm pitch. The beam center was determined with an accuracy of ±1 mm using profile data extrapolation.
The monitor was calibrated by comparing the currents from the cathodes with the readings of organic scintillation detectors. The calibration results confirmed the linearity of the beam profile measurements in the current range from 0.2 to 0.001 pA.
During the experiment, the lower intensity threshold at which the detector begins to register signals was investigated. The possibility of using the monitor in ionization chamber mode for diagnosing low-intensity beams was confirmed, with a current range from 0.001 nA to 100 nA. It was experimentally shown that the monitor maintains functionality at a particle flux density of $2 \cdot 10^3$ particles/s and demonstrates radiation resistance under beam exposure.

Footnotes

Paper preparation format

Word

Region represented

Asia

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