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Fast cyclotron beam probe at UC Davis Crocker Nuclear Laboratory

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The UC Davis Crocker Nuclear Laboratory houses a 72-inch multi-species Isochronous Cyclotron built in the 1960's. For many years, previously unexplained beam dynamics have been indirectly observed at the cyclotron by both internal and external experimenters. Investigating these effects within the cyclotron, at the bunch level, has proven particularly challenging due to the cyclotron's harsh environment of strong magnetic fields, high radiation levels, intense RF interference, and limited space. To address these challenges, a compact segmented beam probe was developed, utilizing a scintillator array target coupled to a SiPM array positioned outside the cyclotron via fiber optic cables. This novel beam probe has enabled precise, high-speed measurements of individual beam bunches, providing data to theoretical models and deepening the understanding of beam dynamics allowing for more precise operation of the cyclotron. These advancements are driving efforts to optimize cyclotron performance for diverse applications, including isotope production, ocular melanoma therapy, and a variety of experimental research.

Footnotes

Paper preparation format

LaTeX

Region represented

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