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Design of an electrostatic chopper for the new ISIS MEBT

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The electrostatic chopper for the new ISIS medium-energy beam transport (MEBT) is a fast deflecting device to create gaps in the beam coming out of the RFQ, which will improve the trapping efficiency when injecting the beam into the ISIS synchrotron. Due to the stabilization time required by the ion source, it is expected that the first 100 μs of the 400 μs pulse need to be removed in order to deliver a clean flat top pulse to the synchrotron. The 300 μs pulse will then be burst-chopped into shorter pulses to reduce the losses at higher energies during the injection into the synchrotron at 50 Hz. The chopper must remove a maximum of 40% of the 300 μs pulse at the initial synchrotron frequency of 1.3 MHz. The deflected beam will be dumped into a beam dump inside the chopper device, while the remaining beam continues into the ISIS DTL. The chopper electrode dimensions were initially estimated from analytical calculations and from the beam dynamics simulations of the MEBT beamline. Electromagnetic (EM) simulations were developed to accurately estimate the field shape, the peak electric fields and the transient response of the chopper. Thermal calculations and a dimensional sensitivity study were also developed, but they are not presented here.

Funding Agency

Footnotes

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Yes

Primary author: RODRIGUEZ, Iker (Science and Technology Facilities Council)

Co-authors: LAWRIE, Scott (Science and Technology Facilities Council); SPEED, Jonathan (Science and Technology Facilities Council)

Presenter: RODRIGUEZ, Iker (Science and Technology Facilities Council)

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