

Direct injection extraction system into a high frequency radiofrequency quadrupole for medical applications

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As part of CERN's medical application research, a compact electrode system (< 30 cm) has been designed to facilitate low-current, multiparticle beam extraction and matching to a high-frequency RFQ. This study explores the innovative extraction system design and evaluates its simulation performance. Superfish (SF) and CST Studio Suite were employed to export the 2D and 3D electric field maps of the extraction system for beam dynamics simulations. Beam dynamics simulations using the Travel code have confirmed the system's ability to deliver a high-quality, low-current particle beam fully matched to a 750 MHz RFQ, capable of accelerating particles with a β/β_0 ratio of $\frac{1}{2}$ to 1. This paper provides an overview of the key design considerations, geometry layout, and beam dynamics results.

Footnotes

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Primary author: MAMARAS, Aristeidis (European Organization for Nuclear Research)

Co-authors: LOMBARDI, Alessandra (European Organization for Nuclear Research); SAMPSONIDIS, Dimitrios (Aristotle University of Thessaloniki); PASINO, Eleonora (European Organization for Nuclear Research); DI LORENZO, Francesco (European Organization for Nuclear Research); LALLEMENT, Jean-Baptiste (European Organization for Nuclear Research); KOOPMANS, Marten (European Organization for Nuclear Research)

Presenter: MAMARAS, Aristeidis (European Organization for Nuclear Research)

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