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Slow Extraction of Charged Ion Pulses from the REX-EBIS

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The Isotope Separator On-Line DEvice (ISOLDE) facility located at CERN, produces and transports radioactive ion beams at low or high energy through the REX/HIE-ISOLDE linear accelerator, for nuclear physics, astrophysics, solid-state physics and applied-physics purposes. Enhancing the charge state of the ions is a prerequisite for efficient acceleration and is accomplished by an Electron Beam Ion Source (REX-EBIS). In conjuction, for effective event discrimination at the experimental detectors, a requirement is to spread the time distribution of extracted ion pulses from this EBIS. A Slow Extraction scheme is presented to determine a step function in time for the extraction potential of the REX-EBIS which demonstrates a lenghtening of the time structure of both stable and radioactive ion beams, with different mass-to-charge ratios and for time structure lengths in the millisecond range. Key operational parameters of the EBIS impacting the average ionic temperature and its axial energy spread are discussed in order to anticipate subsequent changes in the resulting pulse time structure during experimental runs.

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