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Investigating alternative extraction methods at MedAustron

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MedAustron is an ion therapy facility for protons and carbon ions located in Wiener Neustadt, Austria. The beam is presently extracted for clinical operation from the synchrotron with third-order resonant slow extraction via acceleration with a betatron core. However, due to the flexibility of the synchrotron operation for Non Clinical Research (NCR) purposes, other extraction methods can be investigated for potential improvement of the machine performance as presented in this work.

Radio-Frequency Knock Out (RFKO) extraction was investigated by applying an RF signal voltage across the horizontal Schottky plates in the synchrotron. Different excitation signals were evaluated with the required transverse excitation frequency band applied.

Investigation of the synchronous ramping of all synchrotron magnets for extraction via Constant Optics Slow Extraction operation (COSE) was undertaken for a bunched beam in order to extend the implementation of COSE with possible Multi Energy Extraction (MEE).

The last extraction method presented here is via longitudinal RF manipulation in order to extract the beam by sweeping a properly configured empty bucket through the beam stack. This method is known as Phase Displacement Extraction (PDE).

Extraction rates with these methods were observed which meet the clinical requirements and might also be considered compatible with FLASH.

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Footnotes

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Yes

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