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Performance Increase Studies of ECRIS via Double Frequency Heating for Medical Treatment Applications

MedAustron is a synchrotron-based Particle Therapy Accelerator located in lower Austria, delivering proton and carbon beams in the range of 62-252.7 MeV/u and 120-400 MeV/u respectively in two medical treatment rooms. A proton Gantry was also recently commissioned for a third medical treatment room. A fourth beamline with a dedicated experimental room is used for non-clinical research. The accelerator features three identical ECRIS from Pantechnik called Supernanogan operating at 14.5 GHz. Two sources are respectively used for proton and carbon beams production. The third ion source is dedicated for helium beam generation and for accelerator performance improvement studies. The goal of this work is to test the two-close frequency heating. The latter has already been proved to be a valid method to increase the production of higher charge states for other ECRIS. The goal of this work is to test the Two-close Frequency Heating on the Supernanogan in order to improve the long-term stability of the extracted beam which is a crucial parameter for medical ion beams. In this work different frequency sweeps between 13.75-14.5 GHz versus the other relevant source parameters will be performed. These measurements should serve to measure and optimize the stability of extracted current. Beside these sweeps, the beam emittance will be measured in order to understand how this heating mechanism influences the beam properties and the transmission of the beam further in the accelerator.

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