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## Investigations into multi energy extraction at MedAustron

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MedAustron, located in Wiener Neustadt, Austria, is a synchrotron facility used for medical treatment and research. To decrease downtime and increase the efficiency of the machine, multi energy extraction (MEE) techniques are explored. An alternative extraction method to the present betatron core driven extraction is radio frequency knock out (RFKO). This method allows for extracting bunched beams, thus enabling re-acceleration or deceleration without recapturing the particles after partial extraction. This contribution presents MEE studies using the RFKO extraction method through measurements and simulations with Xsuite, exploring energy changes in both upwards and downwards mode. Of particular interest are the effects of the energy change on the longitudinal phase space distribution and the resulting spill behavior. The influence of main dipole ramp rates and RF parameters, such as voltage, on the longitudinal phase space distribution is characterized through longitudinal tomography.

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