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Dynamic Intensity Control of a Slowly Extracted Synchrotron Beam Using Ionisation Chambers

Slow extraction of particles out of a synchrotron is important for many applications in accelerator facilities, e.g. for ion therapy. It is desirable to keep the intensity at the beam-target as good as possible on a predefined level.

In the synchrotron of the Heidelberg Ion Therapy-Centre (HIT) transverse RF-knockout extraction is used to support the raster-scanning method for high-precision dose delivery.

As the phase-space distribution of particles is not homogeneous and varies slightly from pulse to pulse, intensity-fluctuations of the extracted beam appear.

The adjustment of the RF-knockout exciter is time consuming, as the energy range consists of more than 250 levels.

To keep the intensity on a predefined level, a feedback loop has been implemented.

The actual-value of the intensity is provided by ionisation chambers installed at the end of every beam line, the feedback loop controls the amplitude of the RF-knockout exciter.

The technical implementation and the requirements for the involved components are presented.

Tests for both, flat spill with a rectangular intensity profile as well as dynamically adapted intensity show promising results and are presented as well.

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