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A new probe to detect multiple turn extraction of a beam bunch from Injector Cyclotron 1 at iThemba LABS.

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Abstract content
 (Max 300 words)
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 Formatting & Special chars

A non-destructive capacitive probe was developed to monitor the bunch length of charged particles from the Injector Cyclotron 1, thereby providing instantaneous information whether the cyclotron is set up for single-turn extraction or not, during an energy change.

When tuning the injector cyclotron to produce an ion beam of good quality, it is not a straightforward process to ensure that the extracted beam is mono-energetic. The continuous varying performance of the ion source, together with the spiral-shaped beam path in the cyclotron, governed by a precession state due to inherent and variable asymmetrical field conditions, may result in extracting multiple turns. The extracted beam will then have an unacceptable large energy spread and will result in a low intensity beam of poor quality, also causing unwanted activation of beam line components.

Numerical field analysis was performed to simulate a beam bunch of a known length and charge distribution moving past a capacitive probe. The geometry of the probe was iteratively varied until the resulting image from the induced current represented the physical length of the bunch.

The fundamental (elementary) principles and techniques used in the study will be discussed and some calculated and measured results will be presented.

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD)?

N.A.

Main supervisor (name and email) and his / her institution

N.A.

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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