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New Interactive and Graphical Calculation Method for Setting up Isochronous Magnetic Fields in the Solid Pole Injector Cyclotron 2 at iThemba LABS

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Abstract content
   (Max 300 words)

A new interactive method was developed at iThemba LABS to select the current settings of the nine coils that shape the magnetic field of SPC2.

The old method of selecting the current settings is embedded in computer programs written decades ago and based on sparse field measurement data, which excluded some of the coils. Further do we not have any access to the source codes of the chain of programs that are used for the calculations, which does not permit improvements and therefore requires “blind” trust in the calculated result.

The new method is still based on the fundamental principles for setting up isochronous magnetic fields, but using calculated databases from a detailed TOSCA-model of the complete cyclotron. The method further provides an interactive visual display of the magnetic field shape in the cyclotron and its offset from the ideal isochronous field of the selected particle and final energy. The cyclotron operator may now either use a predicted matrix solution from the databases to set the nine coil currents, or fine tune all the current settings interactively whilst observing the changes in the magnetic field. In both instances the offset from the ideal magnetic field and its consequences on the phase of the beam are also shown and updated immediately with any change to any coil.

Apart from the ease of setting up the fields and a better understanding of the effects of any adjustment to any of the nine coils on the field shape, it is expected that the transmission performance of SPC2 may improve and in the long run have a bearing on plans for future radioactive beams at iThemba LABS.

The new method will be discussed and demonstrated.

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