

Design Upgrade of the Mass Separator Magnets for HIE-ISOLDE

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The High Intensity and Energy (HIE)-ISOLDE project at CERN, features major improvements of the High Resolution Separator (HRS).

In its current design, the performance of the HRS is constrained by ion source emittance and second-order distortions in the magnet dipoles. A new layout has been proposed to overcome these limitations. It firstly features the operation of the RFQ beam cooler in order to reach a beam emittance of 3π mm.mrad and its installation before the separation process. Additional ensuing constraints, such as available space in the separator room and positioning between upstream and downstream beamlines, would then not be solved with the 90° and 60° magnets operated in the current design.

The use of a 120° magnet and a 90° bend is consequently seen necessary for the new layout. Second-order aberrations intrinsic to magnetic dipoles and responsible for emittance increase have been compensated by pole shimming.

First estimations shows that the current resolution of the HRS could be multiplied by a factor of 3 with the proposed layout, and rise up to 20 000 for a 3π mm.mrad cooled beam.

Results from numerical simulations and offline tests of the magnet stages of the HRS are presented and discussed together with the new design features.

Primary author: AUGUSTIN, Mathieu (CERN)

Presenter: AUGUSTIN, Mathieu (CERN)

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