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HIE-ISOLDE –Commissioning and first results of the MATHILDE system monitoring the positions of cavities and solenoids inside Cryomodules

The new superconducting HIE-ISOLDE Linac replaced most of pre-existing REX ISOLDE facility at CERN. This upgrade involves the design, construction, installation and commissioning of 4 high-β cryomodules. Each high-β -cryomodule houses five superconducting cavities and one superconducting solenoid. Beam-physics simulations show that the optimum linac working conditions are obtained when the main axes of the active components, located inside the cryostats, are aligned and permanently monitored on the REX Nominal Beam Line (NBL) within a precision of 0.3 mm for the cavities and 0.15 mm for the solenoids at one sigma level along directions perpendicular to the beam axis.
The Monitoring and Alignment Tracking for HIE-ISOLDE (MATHILDE) system has been developed to fulfil the alignment and monitoring needs for components exposed to non-standard environmental conditions such as high vacuum or cryogenic temperatures. MATHILDE is based on opto-electronic sensors (HBCAM) observing, through high quality viewports, spherical retroreflectors made of high index (˜2) glass. Precise mechanical parts, metrological tables and the, so called, MATHIS software were designed to be able to reconstruct the position of the active elements within a precision of 0.1mm.
The commissioning of MATHILDE and its first results to monitor the cavity and solenoid positions, especially during the installation and tests of the two first cryomodules on the HIE-ISOLDE Linac, are reviewed in this contribution.

Summary

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