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A 3D magnetic field measuring system for the CCT magnet units (MAGDEM) of the ISOLDE Superconducting Recoil Separator

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The design of the ISOLDE Superconducting Fragment Separator (ISRS) [1] is based on a compact particle storage ring that uses a FFAG (Fixed Field Alternating Gradient) beam transport and a set of nested multi-function superconducting magnets (MAGDEM) [2]. Each MAGDEM unit include both dipole and quadrupole functions using a Canted Cosine Theta type (CCT) design, whose winding is inclined with respect to the axis [3]. After fabrication and delivery, MAGDEM magnetic field must be verified against specifications. For this purpose, a dedicated magnetic field-scanner system has been designed and prototyped. The "3D magnetic scanner system"is based on a set of point-by-point Hall probes coupled to a linear/rotary robotic arm with sub-millimetre precision. The development includes the specific software, DAC and control systems, safety magnetic shielding. A fully operative demonstrator of the "3D magnetic scanner system"has been built and tested at the University of Huelva. The assembly of the final system is in progress.

References

[1] I. Martel et al, Letter of Intent "Design study of a Superconducting Recoil Separator for HIE-ISOLDE", INTC-I-228, 2021.

[2] ISRS project web site, www.uhu.es/isrs/

[3] G. Kirby et al., Design and Optimization of a 4 Tesla 200 mm Aperture Helium-Free Nb-Ti CCT Nested Quadrupole / Dipole Superconducting Magnet. ASC2024 ID 4070214/1LOr1B-07, in press.

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