



Contribution ID: 339

Type: Poster

Wed-Mo-Po.01-02: Design of a superconducting sector dipole magnet for the High Rigidity Spectrometer at Facility for Rare Isotope Beams

Wednesday 2 July 2025 09:15 (2 hours)

The High Rigidity Spectrometer (HRS) at the Facility for Rare Isotope Beams at Michigan State University is designed to study exotic neutron-rich isotopes at high beam energies. With a maximum magnetic rigidity of 8 Tm, the HRS is optimized for the rigidities at which rare-isotope beams are produced at FRIB. It consists of two main sections: the High-Transmission Beamline and the Spectrometer Section (SPS). A key magnet component of the SPS is the DS2 superconducting dipole magnet, which provides a 60° beam bending capability. This magnet, currently under design, features NbTi conductor embedded in a copper channel to support a passive quench diode protection scheme and generates 2 T dipole peak field to achieve the 8 Tm rigidity. The magnet includes a warm iron yoke with dimension is 5.9 m x 4.2 m x 2.2 m and a pole gap of 0.2 m. To achieve horizontal focusing without additional quadrupole magnets, a 20° pole-face angle is applied to both sides of the magnet poles. This paper presents a detailed design of the DS2 magnet, covering its magnetic properties, coil forces, conductor stability, quench analysis, and mechanical structure.

Author: KIM, Junseong (MIT)

Co-authors: TOUSIGNANT, Bryan (Facility for Rare Isotope Beams, Michigan State University); SMITH, Courtney (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); ZHANG, Danlu; NGUYEN, Hai (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); ZHENG, Hengkang (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); HULBERT, Jeff (Facility for Rare Isotope Beams, Michigan State University); WEI, Jie (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); WENSTROM, John (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); MILLER, Samuel (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); NOJI, Shumpei (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); XU, Ting (Facility for Rare Isotope Beams); DU, Xiaoji (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); AL-MAHMOUD, Yamen (Facility for Rare Isotope Beams, Michigan State University, East Lansing, MI 48824, USA); CHOI, Yoonhyuck

Presenter: KIM, Junseong (MIT)

Session Classification: Wed-Mo-Po.01 - Accelerator Magnets I