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Thu-Af-Po.01-01: Oakridge PPU Magnets –Results and Measurements

Thursday 3 July 2025 14:00 (2 hours)

The Spallation Neutron Source (SNS) at ORNL was being upgraded from 1.0 GeV to 1.3 GeV (or 1.4 to 2.8 MW). Several water-cooled magnets got upgraded to transport 30% higher beam energy. Fermilab contributed the magnet design for the new chicane magnets and injection/extraction septum. Designing the magnets was a challenging task because the new magnets required good combined integrated field quality and needed to occupy the old magnets space but with about 20% greater integrated magnetic field. Additional strong requirements applied to the magnets fringe field do not disturb the circulating beam. After fabrication of the magnets, an extensive measurement campaign was setup and performed at Fermilab's Magnet Test Facility. Magnetic measurements are performed at Fermilab for both projects internal to the lab and as well as work for other laboratories. The measurements needed to assess the performance and compare to magnet design calculations include verification of field strength and harmonics along an 8 m length and 200 mm good field diameter, including end-field Hall probe mapping, for the chicane dipoles, and measurements along two differently curved trajectories within the ~3 m septum gradient magnet. Details of the measurements and system are presented along with results and comparison to field models.

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