



Contribution ID: 495 Contribution code: TUE-PO1-714-03

Type: Poster

## Field quality of the 4.5 m long MQXFA pre-series magnets for the Hi-Lumi LHC Upgrade as observed during magnet assembly

*Tuesday, 16 November 2021 13:15 (20 minutes)*

The U.S. High-Luminosity LHC Accelerator Upgrade Project (HL-LHC AUP) is developing MQXFA magnets, a series of 4.5 m long 150 mm aperture high-field Nb<sub>3</sub>Sn quadrupole magnet for the Hi-Luminosity LHC upgrade at CERN. Five Pre-Series magnets, MQXFA03 through MQXFA07, have been developed. During the magnet assembly stage, we perform magnetic measurements of the coil packs and magnets to track the field quality for two purposes. First, it serves as a quality assurance tool to check if the magnet field quality meets the acceptance criteria. Magnetic measurements are used to understand if/how magnetic shims are needed to compensate low-order field errors and to meet the field quality targets. Second, the measurements during the assembly stage can also help understand the field quality, in particular the geometric field errors for Nb<sub>3</sub>Sn accelerator magnets. Here we summarize the measurement results of the pre-series MQXFA magnets, including the magnetic axis and twist angle. We also report the correlation between the coil geometry and the observed field errors. The results will provide useful feedback for the series magnet production and on the optimization of field quality of accelerator magnets based on wind-and-react Nb<sub>3</sub>Sn technology.

*This work was supported in part by the U.S. Department of Energy, Office of Science, Office of High Energy Physics, through the US HL-LHC Accelerator Upgrade Project, and in part by the High Luminosity LHC project at CERN.*

**Primary authors:** WANG, Xiaorong (Lawrence Berkeley National Laboratory); AMBROSIO, Giorgio (Fermilab); CHENG, Daniel; DIMARCO, Joseph (Fermilab); FERRACIN, Paolo; GHIORSO, William (Lawrence Berkeley National Lab); IZQUIERDO BERMUDEZ, Susana (CERN); PAN, Heng (LBNL); PRESTEMON, Soren; RAY, Katherine (Lawrence Berkeley National Laboratory); SABBI, GianLuca (LBNL)

**Presenter:** WANG, Xiaorong (Lawrence Berkeley National Laboratory)

**Session Classification:** TUE-PO1-714 Magnetization and Field Quality II