

**US-LHC Insertion Region Magnet Error Analysis and Compensation\***, F. PILAT, V. PTITSIN, S. TEPIKIAN, C.G. TRAHERN, J. WEI, BNL - The performance of the Large Hadron Collider (LHC) at collision depends on achieving the highest possible magnetic field quality and alignment accuracy in the insertion-region (IR) triplet quadrupole and IR dipole magnets during low-beta\* operation when beams cross at a design crossing angle. These superconducting magnets will be mainly built at USA (BNL, FNAL, and LBL) and Japan and assembled at FNAL. Based on the expected construction and measurement errors of these magnets, we evaluate the impact on the LHC dynamic aperture during collision. In order to maximize the value of the magnets, we study compensation schemes and their effectiveness including optimizing the orientation of the lead ends, amplitude-weighted body-end compensation, shimming with tuning shims, correction with local IR correctors, and sorting.

\* Work performed under the auspices of the U.S. Department of Energy.