Abstract ID : **136**

Design, construction, and test of a superconducting dipole based on the Optimum Integral Design

Content

Design, construction, and test of a ˜3.8 T, 114 mm aperture dipole based on the Optimum Integral Design using the Direct Wind technology will be presented. This work is being carried by Particle Beam Lasers, Inc. (PBL) and the Brookhaven National Laboratory as a part of the Small Business Technology Transfer (STTR) program. The design significantly reduces the loss of effective length due to the end and is, therefore, particularly attractive for short magnets, such as some needed in the Electron Ion Collder (EIC). The parameters are chosen to meet the design requirements of the full length EIC interaction region dipole B0ApF. In the Optimum Integral Design, the midplane turns extend essentially the full length of the coil, and the fields in the body and ends are combined for optimizing the integral field harmonics. The Optimum Integral Design creates a higher integral field for a given coil length. A proof-of-principle 1.7 T, 114 mm aperture, 600 mm long, 2-layer superconducting dipole was successfully designed, built and tested earlier as a part of a Phase I grant. A six-layer, ˜3 T coil was constructed and tested (including the warm field harmonics measurements) during the first year of the Phase II program. All twelve layers of the coil have been wound. The final construction and assembly of the magnet is underway to prepare it for cold testing.

*This work was supported by DOE Grant No. DE-SC0021578 and by Brookhaven Science Associates, LLC under contract No. DE-SC0012704, with the U.S. Department of Energy.

Primary author: Dr GUPTA, Ramesh (Brookhaven National Laboratory)

Co-authors: Mr BECKER, Jason (Brookhaven National Laboratory); Mr ESCALLIER, John (Brookhaven National Laboratory); Mr JOSHI, Piyush (Brookhaven National Laboratory); Dr KUMAR, Mithlesh (Brookhaven National Laboratory); Mr MARONE, Andrew (Brookhaven National Laboratory); PARKER, Brett (Brookhaven National Laboratory (US)); Mr ANERELLA, Michael (Brookhaven National Laboratory); Dr LARSON, Delbert (Particle Beam Lasers, Inc.); Mr WEGGEL, Robert (Particle Beam Lasers, Inc.); Dr KAHN, Stephen (Particle Beam Lasers, Inc.); Mr KOLONKO, James (Particle Beam Lasers, Inc.); Dr SCANLAN, Ronald (Particle Beam Lasers, Inc.); Dr WILLEN, Erich (Particle Beam Lasers, Inc.); ZELLER, Al (Florida State Univ.); WEGGEL, Carl (M.A.G.I.C., LLC)

Presenter: Dr GUPTA, Ramesh (Brookhaven National Laboratory)

Track Classification: A01: Superconducting Accelerator Magnets

Contribution Type: Oral or Poster

Submitted by **GUPTA, Ramesh** on **Saturday 11 January 2025**