



Contribution ID: 664

Type: **Contributed Oral**

Wed-Af-Or1-02: Development of a second COMB dipole magnet with STAR® wires

Wednesday 2 July 2025 16:45 (15 minutes)

Rare-Earth Barium Copper Oxide (REBCO) coated conductors are an attractive option for application in high-field accelerator magnets due to their high critical field and the convenience of fabrication without heat treatment compared to some other superconductors.

Fermilab plays a vital role in superconducting accelerator magnet R&D under the framework of the U.S. Magnet Development Program. An integral part of that program is the accelerator magnet development based on REBCO conductors to demonstrate self-fields of 5 T or greater compatible with operation in hybrid configurations to generate fields beyond 16 T for future High Energy Physics (HEP) applications.

A small, two-layer REBCO dipole magnet based on the Conductor on Molded Barrel (COMB) magnet technology, developed at Fermilab with Symmetric Tape Round (STAR®) wires from AMPeers LLC was recently fabricated and tested in liquid helium, demonstrating the design feasibility.

A second dipole magnet based on the same technology is currently under development at Fermilab. The coil has a 60-mm clear bore and a 120-mm OD and consists of six layers of graded STAR® conductor, which allows to significantly increase the magnetic field compared to the previous design, and potentially probe the 5 T self-field target.

The magnet is tested standalone in liquid nitrogen and liquid helium and may also be re-assembled and tested later as an insert into a Nb₃Sn magnet. This paper reports the progress in the magnet development and discusses the preliminary test results.

Author: Dr KASHIKHIN, Vadim (Fermi National Accelerator Laboratory)

Co-authors: TURRIONI, Daniele (Fermi National Accelerator Laboratory); SANDRA, Jithin sai (AMPeers LLC); DIMARCO, Joseph (Fermi National Accelerator Laboratory); SELVAMANICKAM, Kala (AMPeers LLC); BALDINI, Maria (Fermi National Accelerator Laboratory); MAI, Nghia (AMPeers LLC); COHAN, Sean (Fermi National Accelerator Laboratory); XUE, Shengchen (AMPeers LLC); KRAVE, Steve (Fermi National Accelerator Laboratory); STOYNEV, Stoyan (Fermi National Accelerator Laboratory); SAMBANGI, Umesh (AMPeers LLC); SELVAMANICKAM, Venkat (AMPeers LLC & Department of Mechanical Engineering, Advanced Manufacturing Institute, University of Houston); MARINOZZI, Vittorio (Fermi National Accelerator Laboratory)

Presenter: Dr KASHIKHIN, Vadim (Fermi National Accelerator Laboratory)

Session Classification: Wed-Af-Or1 - HTS and Hybrid Magnets for Accelerators