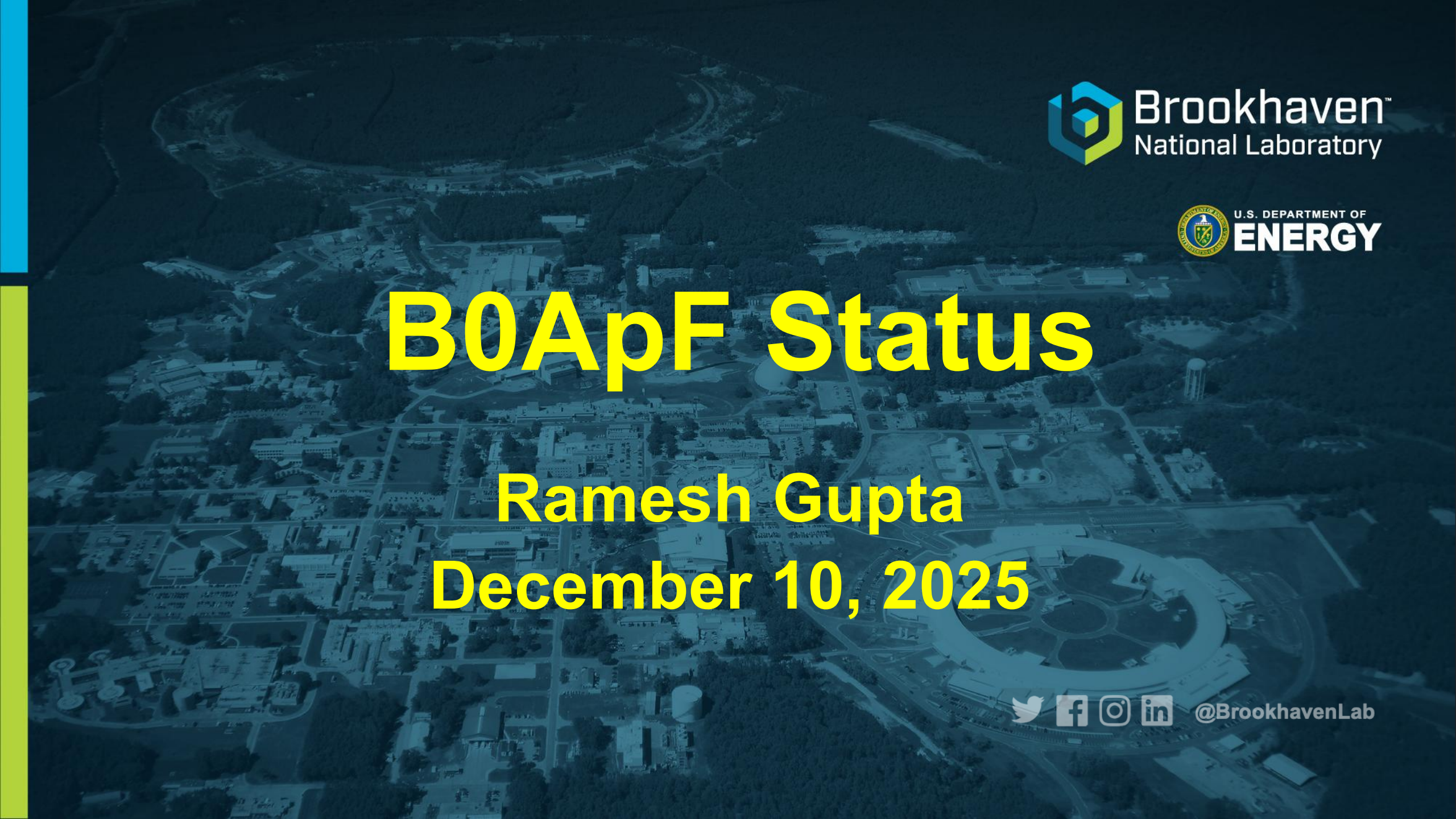
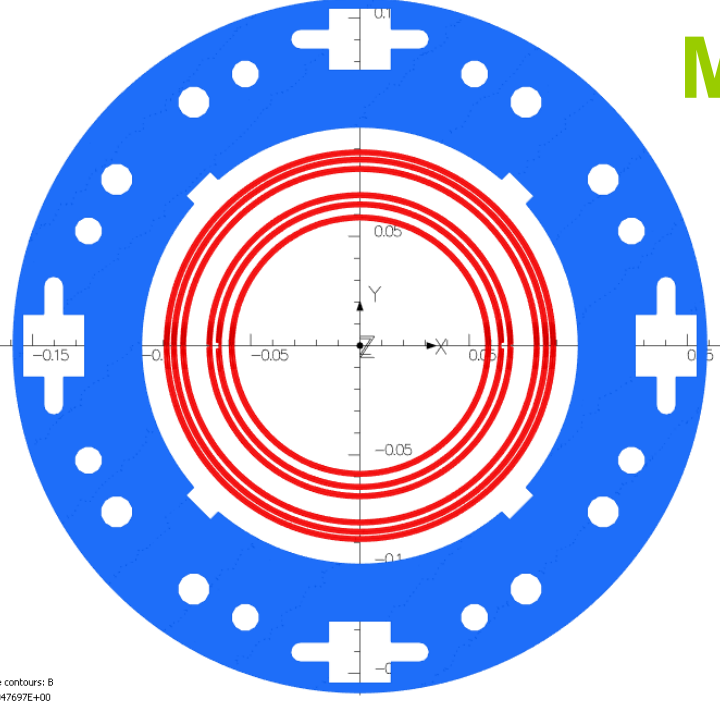

Brookhaven
National Laboratory
U.S. DEPARTMENT OF
ENERGY
B0ApF Status
Ramesh Gupta
December 10, 2025
@BrookhavenLab

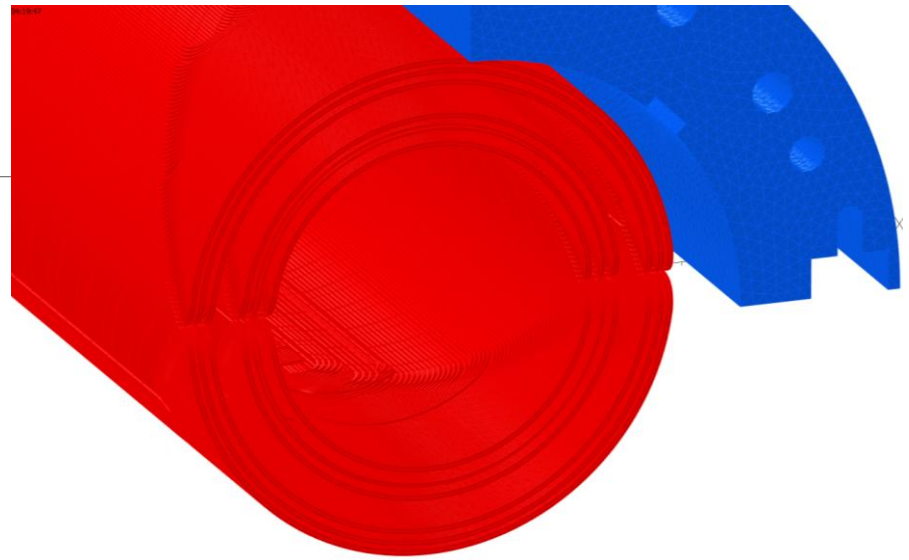
Overview

- **Full length R&D magnet was built under a PBL/BNL STTR based on the Optimum Integral Design* for EIC.**
  - A New Medium Field Superconducting Magnet for the EIC. **Phase II STTR**, DE-SC0021578, April 2022 $1,1500,000, (Summary, Narrative, Presentations)
- **Iterated design is waiting for the new magnet parameters**
- **One slide each on (1) the summary of the STTR design and on (2) the test**

* https://wpw.bnl.gov/rgupta/optimum-integral/

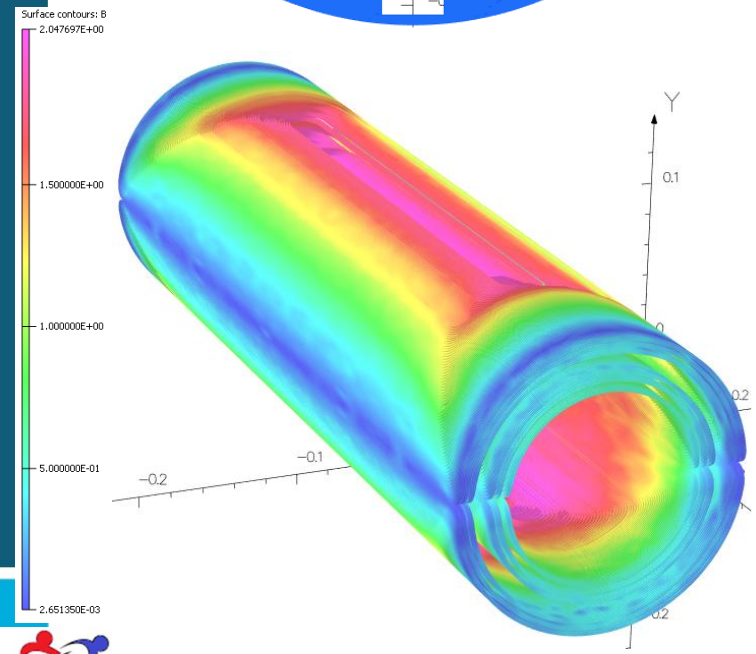
Magnetic Design of the 12 Layer OID B0ApF

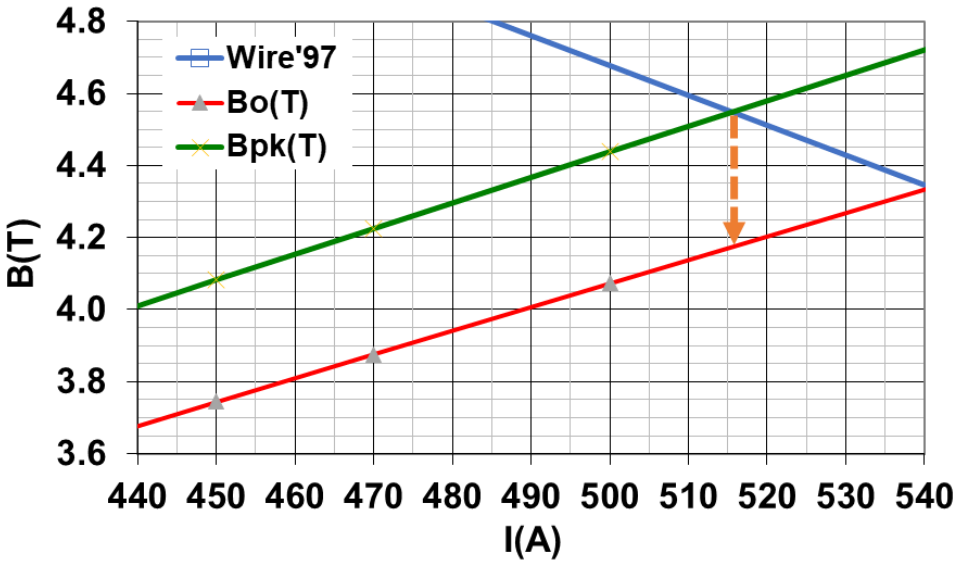




Key Parameters:

- Coil id, od: 114, 183 mm
- Coil length: 600 mm
- B_o, B_{pk}: 3.9T, 4.3T @470A
- Integral field: 1.98 T.m
- Inductance: ~700 mH
- 12 Layers (6 + 6)
- **Intermediate SS tube**





- Superconducting wire diameter: 0.33 mm
- Filament diameter: 10 μm
- Cable type: 6-around-1
- Cable diameter (bare): 1 mm
- Cable diameter (Kapton insulated): 1.1 mm
- Critical current (4.2K, 5T): > 421 A
- Copper to superconductor ratio: 2.25
- Cable used in the magnet: 1.7 km
- Computed quench current at 4.2 K: ~500 A

Testing of the Optimum Integral Dipole B0ApF

- **Magnet was energized (with NO spontaneous quench) to ~2.9 T (~74% of the required field integral for B0ApF at that time; requirement now reduced)**
- **Test seems to be limited by a superconducting lead from magnet to top hat (should be fixed in next run)**
- **Magnet is getting ready for re-test after the repair**