

## Common coil design update

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The common coil geometry offers a 2-in-1 conductor friendly block coil dipole design based on simple race-track (mostly flat) coils with large bend radii. Significant progress has been worldwide since FCC2016 in various designs of 50 mm aperture high field 2-in-1 dipoles based on the common coil geometry. These include designs of (a) 16 T dipoles based entirely on Low Temperature Superconductors (LTS) and (b) 20 T dipoles based on High Temperature Superconductors (HTS) in addition to LTS. In particular, the coils have become simpler, stored energies and inductances smaller, field quality has improved and the mechanical structure has been more developed. Brookhaven National Laboratory (BNL) is working and collaborating with other institutions in the United States and worldwide to make this design more suitable for future high energy colliders.

The work on common coil design at BNL is primarily being performed under the US DOE SBIR/STTR programs with the Particle Beam Lasers, Inc. (PBL). BNL/PBL team is also getting ready to test a pair of HTS coils in the background field of 10 T the Nb<sub>3</sub>Sn common coil dipole, making it an early test of an HTS/LTS hybrid common coil magnet.

In addition to providing the status of the common coil design, the experience of operating the BNL Nb<sub>3</sub>Sn common coil dipole after a decade and the experience of an HTS/LTS hybrid coil test will also be presented.

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