Two Related R&D programs. Magnet Design Program (MDP) and Small Business Technology Transfer (STTR)

**MDP:** “In-field quench studies of a long CORC cable” via one 8-turn HTS coil (S-turn in to flip the polarity) in the background field of common coil dipole

➢ A good collaborative efforts between MDP partners and ACT. Regular discussion on goals, instrumentation and test planning, etc.

**STTR:** “Demonstration of a high field HTS/LTS hybrid dipole” with two sets of double pancake coils made with 6+8 turns (total 28 turns) of CORC cable

➢ This presentation will give the status of the MDP
This presentation benefited from the discussions with and direct contributions from the following colleagues:

ACT: Danko van der Laan, Jeremy Weiss
ASC: Ernesto Bosque, Lance Cooley
BNL: Anis Ben Yahia, Michael Anerella, Jesse Schmalzle, Piyush Joshi, ...
FNAL: Vadim Kashikhin, Vito Lomardo
LBNL: Xiaorong Wang, Maxim Martchevsky, Reed Teyber, Steve Gourlay

... and more
CORC Coil Programs with the Common Coil Dipole

**STTR Coils two sets:** Each with 6 and 8 turns

**STTR:** High field Demo (13-14 T with 10 T from LTS)

**MDP:** Quench studies and technology demo (10.7 T with 10 T from LTS)

**CORC® coils will run in series with the Nb$_3$Sn coils**

**MDP Coil 4+4 turns with an S-turn**
CORC Coil Package

- Overall thickness – 30.3 mm
- Outer plates – 2 mm
- Coil spacers – 7 mm
- Inner plates – 5 mm
- Gap between layers – 2.3 mm

- Each layer held together with flat head screws
- Assembly held with shoulder screws to allow separation of layers.
Coil & Structure Parts, as Designed
Parts, as Made or Delivered (1) (all parts in hand now)
Parts for the other-side of the coil
Coil Parts
Coil Parts
Coil Parts
Coil Parts
Status Report on the CORC Coil Program

- Ramesh Gupta, BNL  
  May 26, 2021

Summary and Schedule

➢ A good collaborative effort between different partners with regular meeting and discussions on all aspects of the program

➢ Coil parts received. All meet requirement except one (not a showstopper)

➢ These parts are being sent to ACT for further inspection and to adjust their cable design. ACT will also investigate routing of v-tap wire and insulation

➢ BNL to receive back coil parts and practice cable from ACT in about a month

➢ BNL will do practice winding (including investigation of winding machine)

➢ ACT to provide CORC cable in about 3 months

➢ Coil construction and test preparation will take another 3 months

➢ Target test date is by the end of 2021
Parameters of BNL Dipole DCC017

- Two layer, 2-in-1 common coil design
- 10.2 T bore field, 10.7 T peak field at 10.8 kA short sample current
- **31 mm horizontal aperture**
- **335 mm vertical aperture**
  - A unique feature for insert coil or cable testing
- 0.8 mm, 30 strand Rutherford cable
- 70 mm minimum bend radius
- 85 mm coil height
- 614 mm coil length
- One spacer in body and one in ends
- Iron over ends
- Iron bobbin
- Stored Energy@Quench ~0.2 MJ