



U.S. MAGNET
DEVELOPMENT
PROGRAM

Possible areas for BNL Integration to MDP

MDP Collaboration Meeting, January 16-18, 2019

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How BNL can help MDP

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- **Thank You!**
- **Overview of BNL SMD capabilities**
- **Capabilities of interest to MDP**
- **BNL integration plan**
- **Conclusions and discussion**

Superconducting Magnet Division – a Rich History



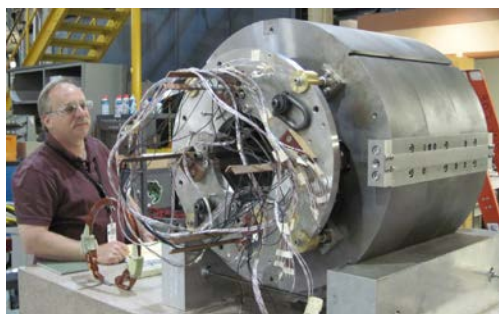
Relativistic Heavy Ion Collider –
strong history of
industrialization at Brookhaven



Magnets for Large Hadron
Collider – Geneva, Switzerland



Hadron Electron Ring Accelerator
magnet – Hamburg, Germany



High temperature superconducting magnet for
Facility for Rare Isotope Beams, Michigan State



High temperature superconducting magnetic
energy storage device

<https://www.bnl.gov/magnets/projects.php>

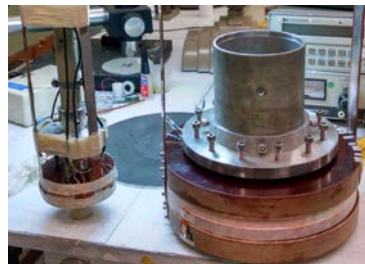
Superconducting Magnet Division – a Bright future

Current Projects and thrusts-

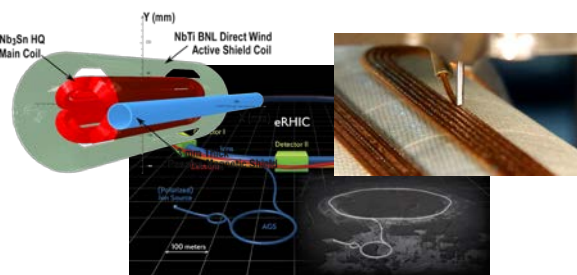
Team – 33 scientists,
engineers, technicians,
support staff

Capabilities –
Magnet EM and
Mechanical design,
magnet testing,
cryogenics

Facilities –
Coil winding including
automated, cold mass
assembly, multiple
magnet test facilities,
cryoplant



International Basic Science
center Korea – coils for 25T
solenoid



eRHIC design



Magnets for the Large Hadron
Collider High Luminosity
upgrade

**Collaborations with superconducting
Industry** – universities, companies, other labs

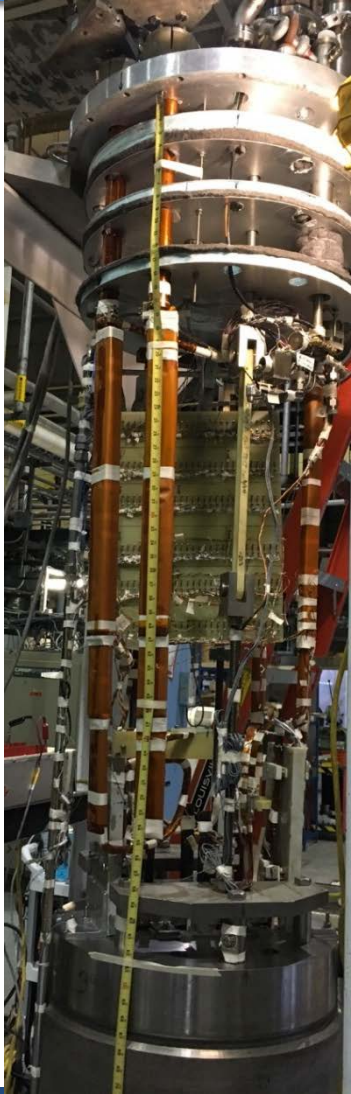
What does Brookhaven bring to the table?

- Brookhaven has the only operating superconducting collider in the US
- Brookhaven has a strong history of designing and industrializing SC magnets
- BNL has a strong HTS program with a high field (10 T+) test facility
- BNL has a world class facility that can take magnets from concept to build to test

What does Brookhaven bring to the table?

- These capabilities are a significant asset to the MDP program
- With the HTS program and the deep expertise in industrialization of accelerator magnets, Brookhaven brings a unique combination of capabilities to bear for MDP
- We would like to fully engage with the ongoing R&D program

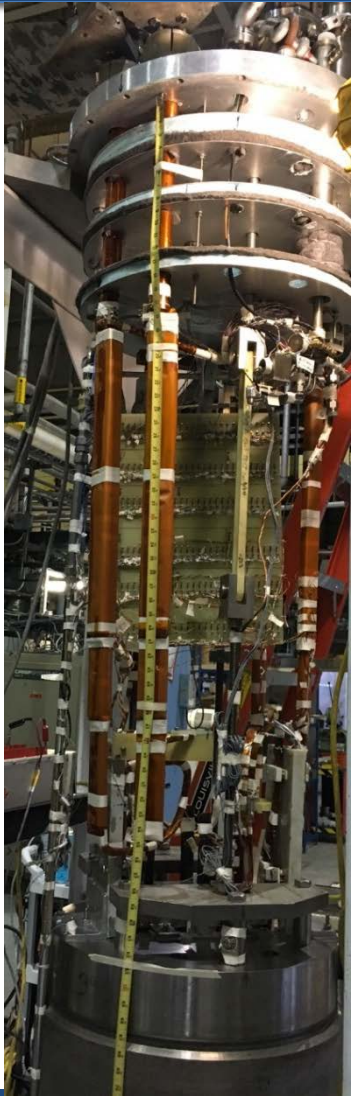
MDP initial opportunities



- A high field testing capability for HTS coils can be applied immediately to address MDP needs, particularly address the technology issues of interest today
 - CORC hybrid magnet already underway with support from SBIR =>scope can be expanded for quench propagation studies
 - Rapid testing of sample coils at high fields to address/understand coil components impacting quench at high fields in REBCO tape coils, Bi2212 coils (LBNL), Nb_3Sn coils with different epoxies, etc. ...
 - Field parallel magnetization measurements
- Demonstration of unique coil configurations at high fields – e.g. clover-leaf coil
- We want to engage with the MDP Community to identify ways we can help



Specific activities for FY 19 – Develop and deliver the “R&D Factory”



- **Test 2 coils from collaboration partners. Coils made of 2212, REBCO or Nb_3Sn – to be discussed**
 - Hybrid magnet performance – coupling between HTS/LTS coil
 - Quench protection of HTS coils in a hybrid structure
- **Quench propagation studies on CORC cable/coil**
- **Field parallel magnetization studies**
- **Small, targeted lead upgrade to extend performance**
- **Develop multi year plan with MDP leadership where our capabilities can enhance the program**

- BNL is thrilled to be part of MDP
- We have world class facilities and people who want to collaborate and help drive the future of magnet technology
- Initial plans are to use our high field test facility to help accelerate understanding of coil and conductor behavior at high fields
- We are very open to collaboration and input on how we can help
- Thanks again!