

FY04, 05 Priorities and Plans BNL Dipole R&D

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Contents

LARP Dipole R&D Priorities:

- Development and optimization of two different support structures (for the same magnetic design)
 - 3 part laminated collar support,
 - Stainless steel weldment
- Coil development as part of Base Program
 - 10 turn coils
 - 12T R&D magnet

LARP Dipole Support Concept Review

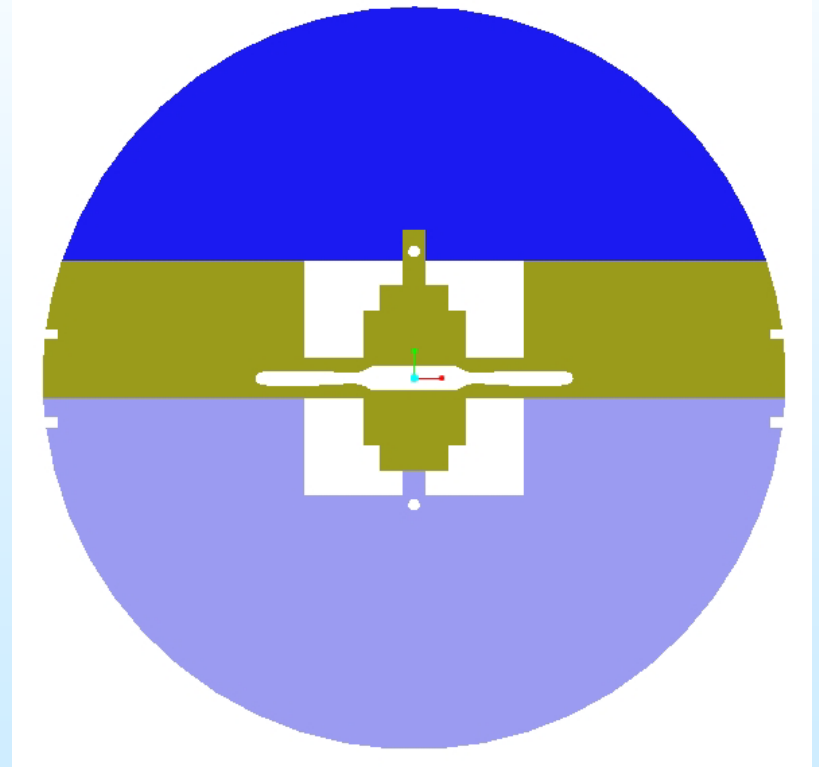
Laminated Collar support

Pros:

- Open midplane
- Easy (inexpensive) to build
- Accurate geometry

But:

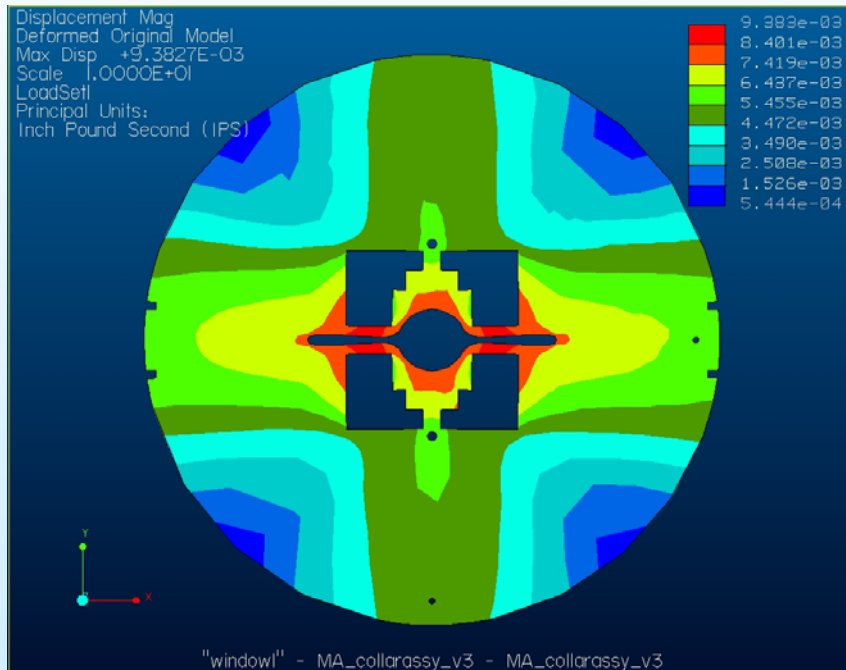
- Heat absorbed
at 4K (old), 80K (new)



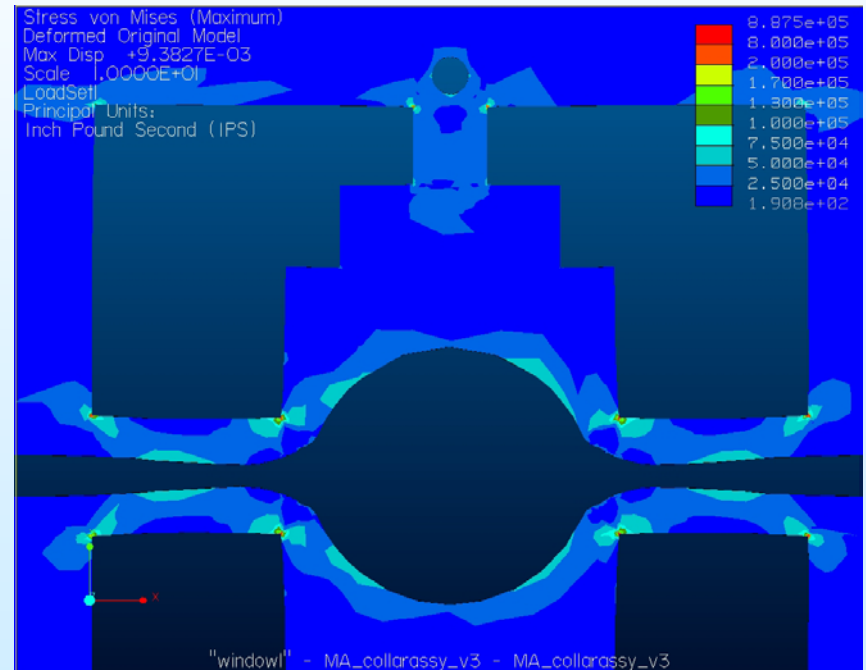
LARP Dipole Support Concept Review

Laminated Collar support (cont'd)

Deflections



Stresses



LARP Dipole Support Concept Review

Stainless steel weldment support

Pros:

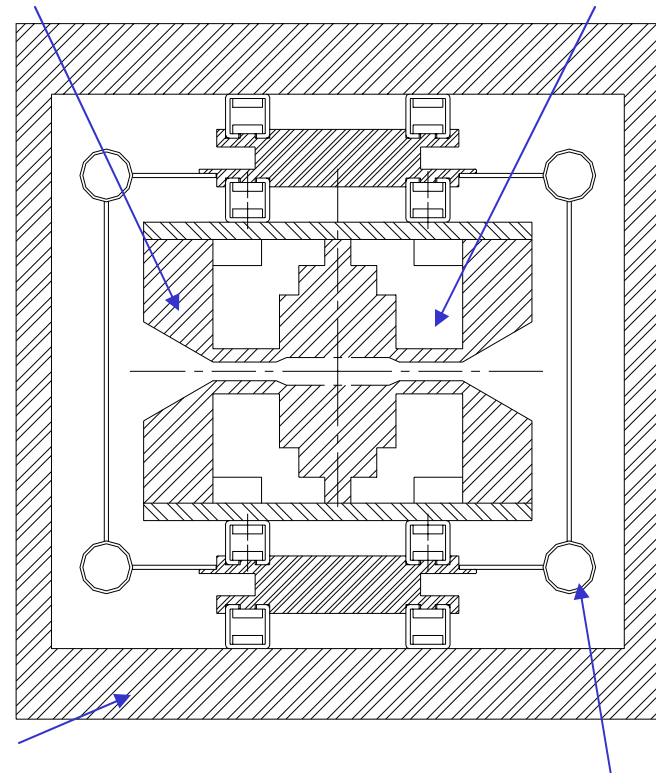
- Open midplane
- Heat absorbed ~300K

Cons:

- More expensive
- Deflections vs. conductive heat load

4K support structure

SC coils



300K cryostat

80K heat shield

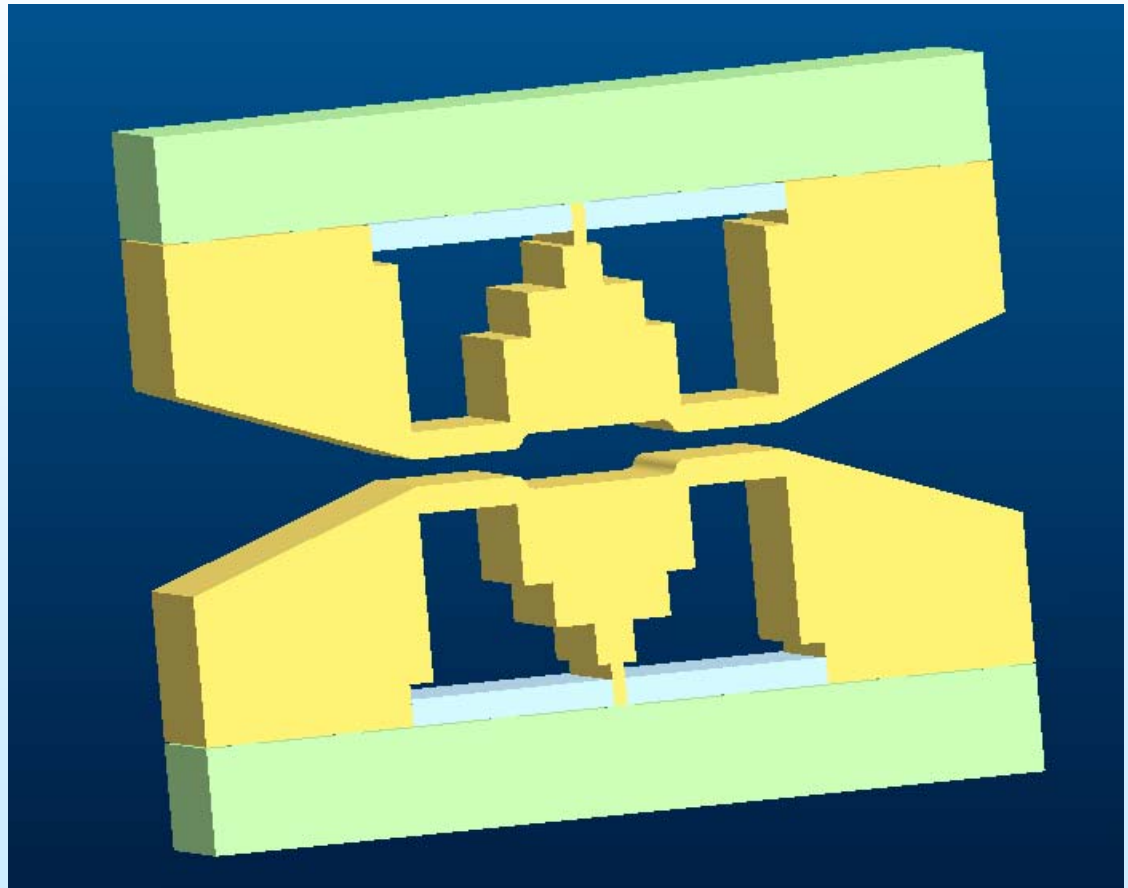
300K iron (not shown)

LARP Dipole Support Concept Review

Stainless steel weldment support (cont'd)

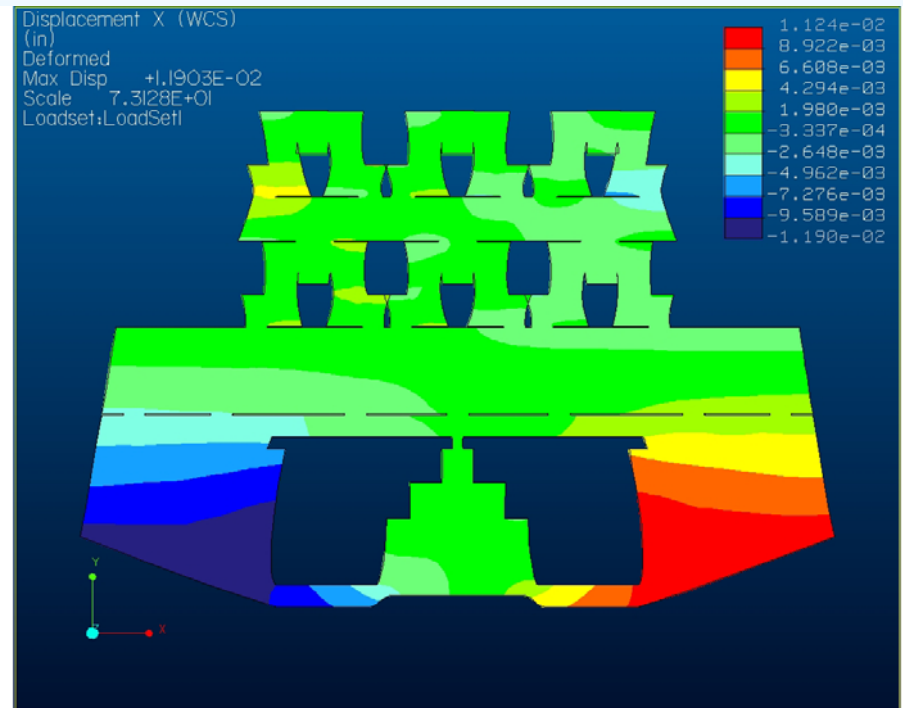
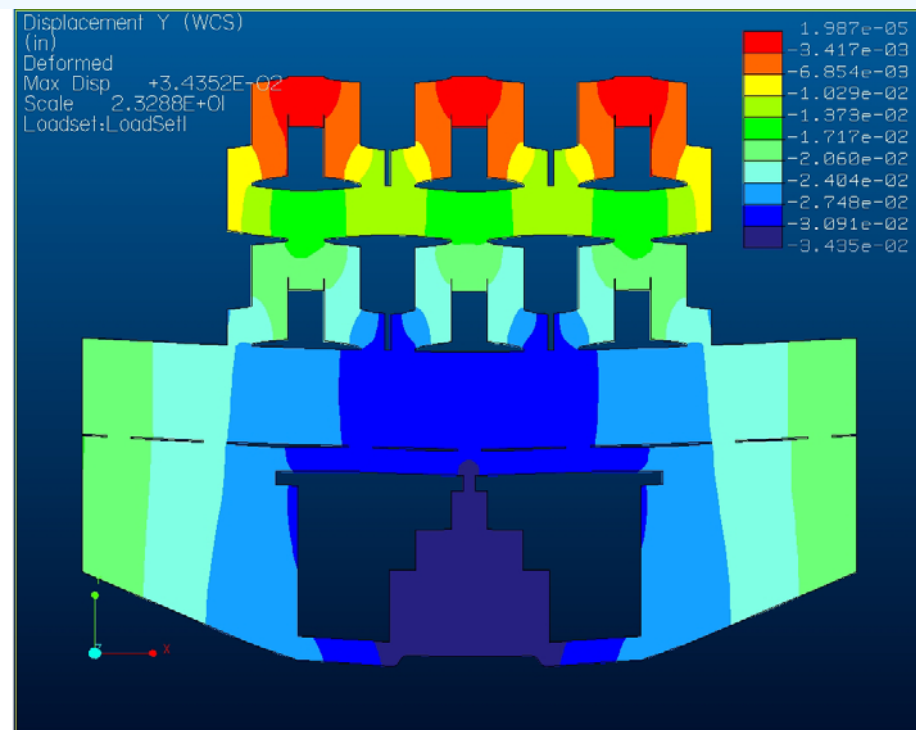
Working model so far:

- Stresses ok
- 3/4 mm deflection
- 40w/m at 4K



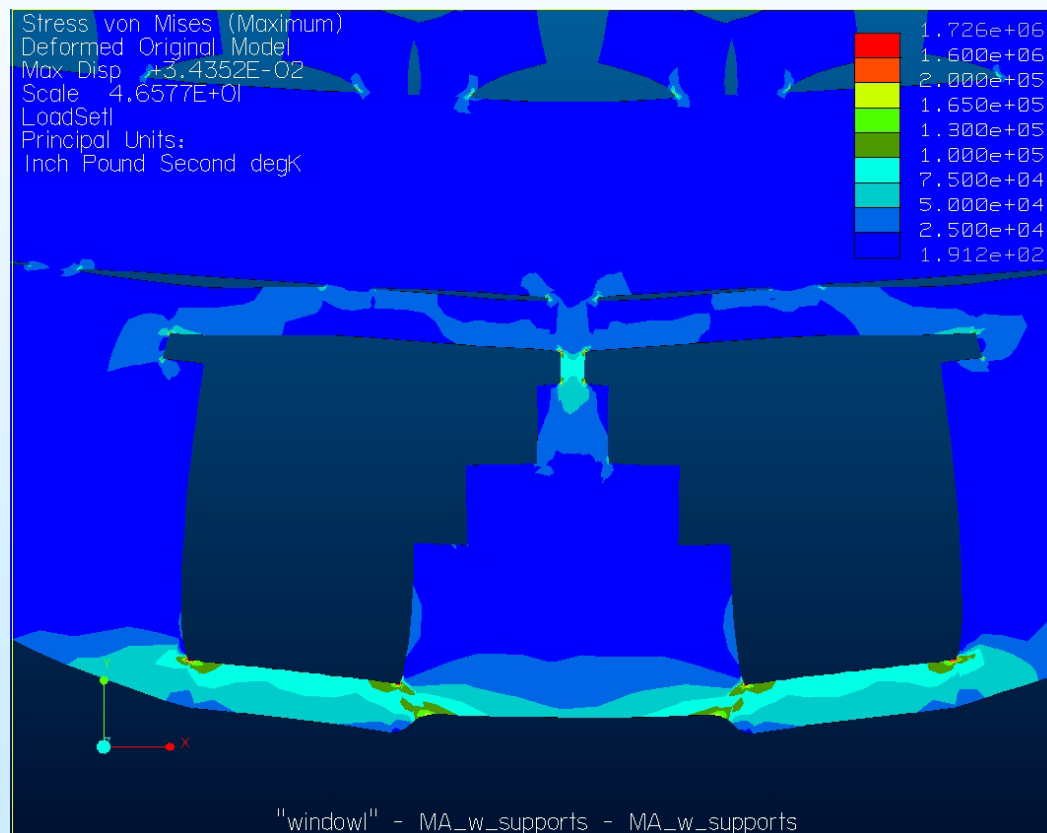
LARP Dipole Support Concept Review

Stainless steel weldment support (cont'd) deflections



LARP Dipole Support Concept Review

Stainless steel weldment support (cont'd) peak stresses



LARP Dipole Support Concept Review

FY04, 05 Plans:

- Revise mechanical models to reflect most recent magnetic design
- Continue development of both configurations (i.e., work on weaknesses)
- Develop greater understanding of requirements
- Select and optimize final design

Base Program Support

Coil Development Plans

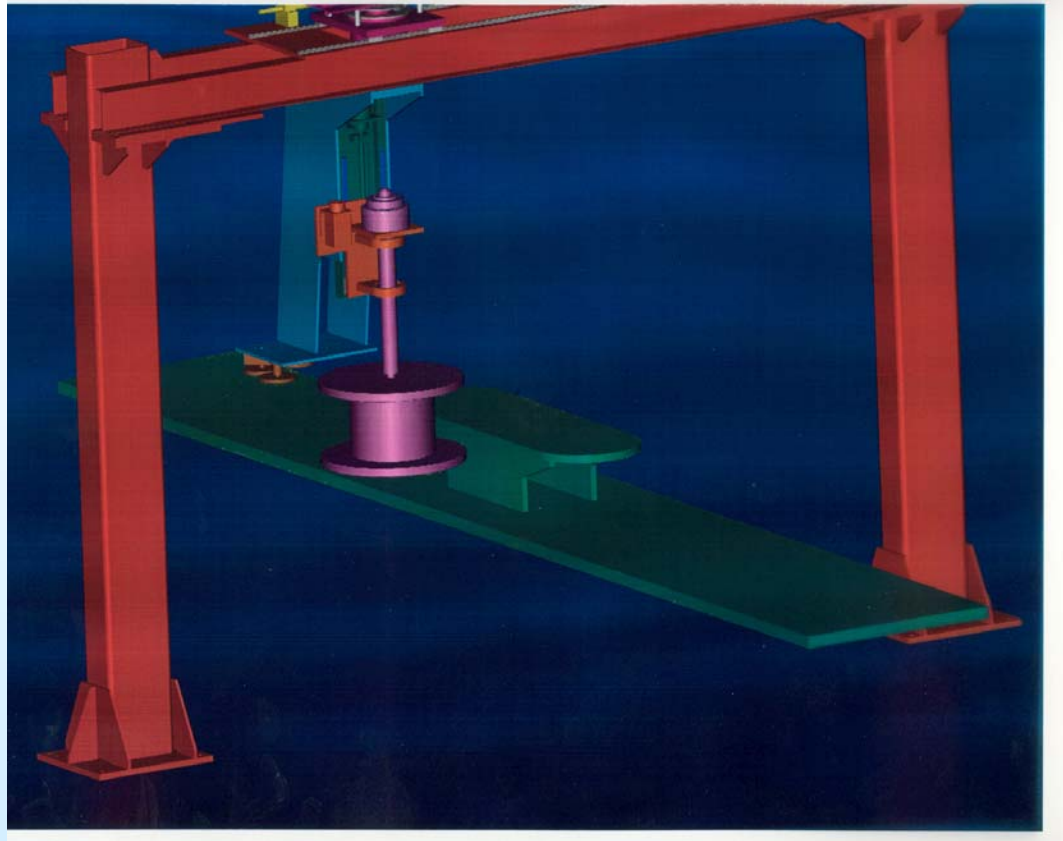
Develop Infrastructure:

- new improved coil winder being brought on line
- utilize integrated approach to cable handling;
react>wind on common spool, minimize risk

Coil R&D:

- Initiate parametric studies in single coil tests;
requires significant length of established sc cable

New Versatile Coil Winder



The new winder will be used in winding future HTS and Nb_3Sn coils. This versatile winder will handle brittle materials better and will wind coils having different number of turns in various geometries.

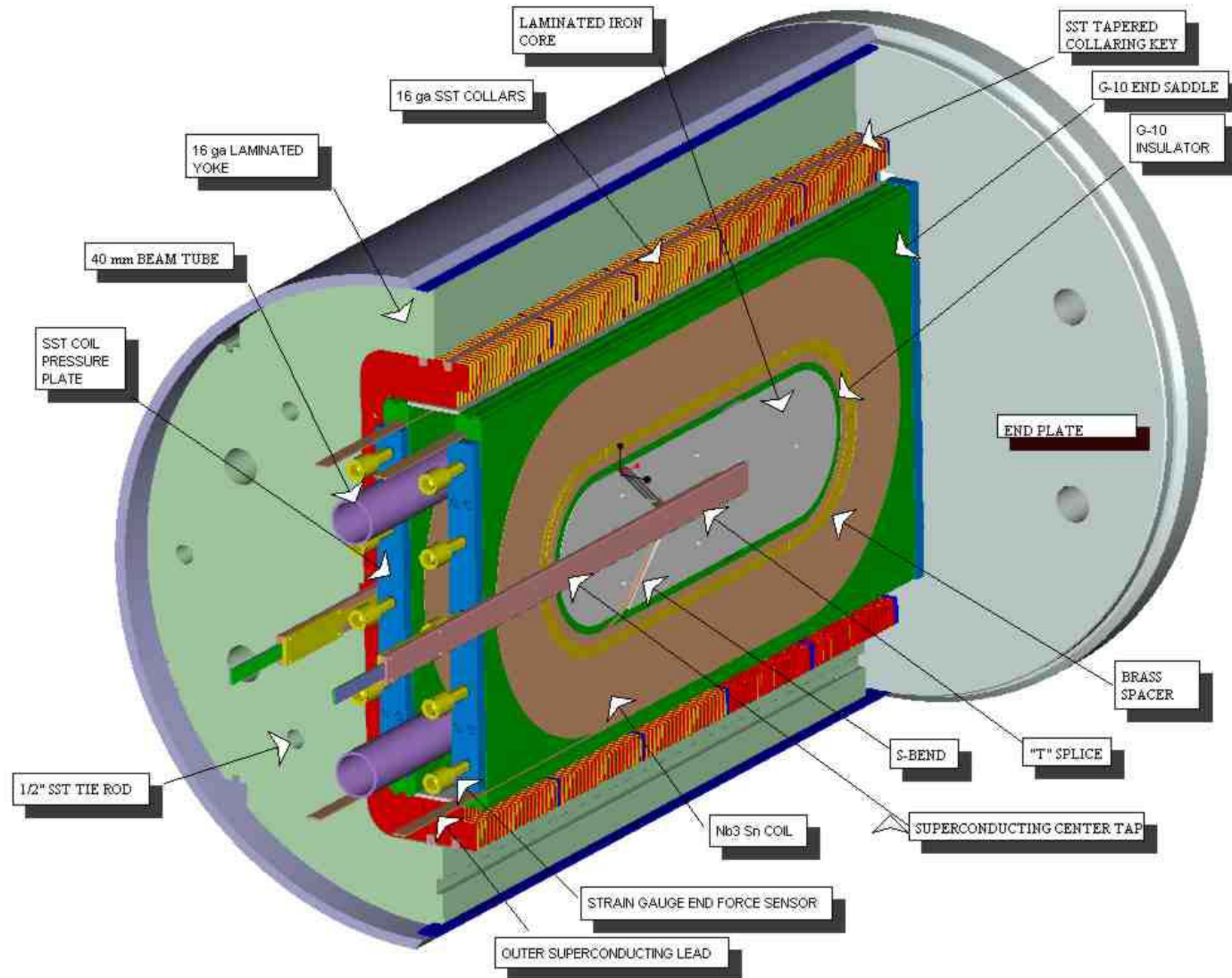
Base Program Support

12T Magnet Program Plans

**Build and test the 12T R&D magnet
(assumes successful coil development)**

- **many parts are available now (collars, yoke, etc.)**
- **Final test of qualified coils in full field**
- **Future test vehicle for high field cable testing**

BNL 12 T Nb₃Sn Common Coil Background Field Dipole



Summary

- **Two good candidates are being examined for an open midplane dipole.**
- **Continued interaction should lead to a successful final design.**
- **Continued effort in the Base Program for coil development is essential.**
- **Funding is also helpful.**