



---

# Superconducting Magnet R&D Program

LARP Collaboration Meeting

Port Jefferson, NY

September 16 – 18, 2003

Stephen A. Gourlay



# FY04 Magnet Program

- **Technology Development**
  - Racetrack quad
  - Support Structure R&D
    - Evaluate bladder and key structure
    - Labor + most M&S supported by base programs
  - Heat transfer measurements
- **Dipoles**
  - Mechanical analysis of BNL design
  - Heat transfer modeling
- **Cable R&D**
  - Keystoned cable
    - Map parameter space, new techniques?
  - Evaluation
    - Extracted strand measurements
  - Stress degradation measurements?
- **Quads**
  - Dual-bore studies
  - Racetrack quad evaluation



# FY04 Activities

- Quads/Technology Development

- Evaluate racetrack geometry
- Evaluate quad key and bladder structure



Test racetrack quad

Alignment and assembly procedures  
Stress degradation?

FNAL 0.2 FTE S/E

LBL \$10k M&S

Devise a quad test we can afford  
in FY05



# FY04 Activities

- Quad options

- Evaluate dual-aperture quad geometries
  - Parallel axis
  - Non-parallel axis

FNAL 0.2 FTE S/E

LBNL 0?

- Dipoles/Technology Development

- Open mid-plane mechanical analysis
- Heat transfer analysis
- Heat transfer measurements

BNL 0.5 FTE S/E

LBNL 0.2 FTE S/E, 0.2 D/T, \$5k M&S

FNAL 0.1 FTE S/E



# FY04 Activities

- Cable R&D

- Keystoned and rectangular cable

- Map parameter space

FNAL 0.1 S/E, 0.1 D/T, \$2k M&S

- Evaluation

LBNL 0.1 S/E, 0.1 D/T, \$5k M&S

- Extracted strand measurements

- Stress degradation measurements?

- Devise techniques/experiments to evaluate



# FY04 Labor Breakdown

- Heat Transfer

## Labor Summary

		S/E	D/T
– Analysis	BNL 0.2 S/E		
– Studies	BNL 0.1 S/E, FNAL 0.1 S/E LBNL 0.2 S/E, 0.2 D/T	BNL 0.5 FNAL 0.4 LBNL <u>0.3</u>	0.0 0.1 <u>0.3</u>

- Quad Design                      FNAL 0.2 S/E                      Total 1.2                      0.4
- Dipole mechanical structure                      BNL 0.2 S/E
- Cable studies                      FNAL 0.1 S/E, 0.1 D/T  
LBNL 0.1 S/E, 0.1 D/T



# FY04 Action Items

- Until we prove differently, radiation damage is biggest concern
  - Conservative evaluation
  - Investigate possibility of experiments to measure limits
    - Materials
    - Superconductor
  - FY05 task will be to do tests
  - Need X % of Nikolai
    - User-friendly interface for aperture/magnet studies
- Conceptual studies to maximize effective aperture



## FY04 Action Items (cont'd)

- **Heat Transfer of composite coils/cold mass**
  - Experiments to verify input parameters for models. Big impact on design. Need the details.
  - Can we increase heat transfer of composite coils?
  - What is maximum allowed cryo load? Need a working number
  - Advantages (if any) of 1.8K operation
- **Definition of the good field region for the dipoles that is more relevant for the aspect ratio of the beam.**
- **Build a quad ASAP**
- **Put together specifications and requirements book.**



# Logistics

---

- Quarterly videoconferences
- FY summaries
- Annual meeting (earlier)
- Web-site (bulletin board)