



Fermilab LARP magnet R&D FY04-FY06 status and plans

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Outlines

IRQ R&D major milestones

FY2004 goals

FY2004 IRQ R&D progress

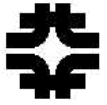
FY2005 and FY2006 budget and plans



IRQ R&D milestones



- FY2012 – IRQ design, technology and component specs are developed and demonstrated on full-scale prototype
- FY2010 – accomplish short model R&D and start design of the full-scale prototype
- FY2006 – test 1st short model
- FY2005 – start design of the 1st short model
- FY2004 – conceptual design studies



IRQ R&D FY2004 Goals



- Evaluation of different design approaches to 2nd generation IR quads, their possibilities and limitations
- Development of the preliminary magnet requirements (aperture, field gradient, field quality, operation margin, etc.) and coordination them with AP group
- Preparation to the short model R&D phase, development of the conceptual design for the first model
- Technology development:
 - development and studies of cable prototypes for the IRQ models

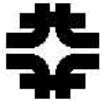


FY2004 IRQ R&D: Q1



Magnetic analysis of single-bore block-type quads and comparison with the shell-type quad designs

- Block-type quads of two designs have been analyzed and compared with shell-type quads
 - Preliminary results were reported in December 2003 on BNL/Fermilab/LBNL video meeting
 - Details will be presented by Vadim Kashikhin and summarized in technical note
- Conclusion: shell-type design is more preferable for this application



FY2004 IRQ R&D: Q2



Magnetic analysis of the double-aperture IR quadrupoles

- Goal: studies of field quality restrictions on magnet aperture separation and aperture size
 - Results will be reported in March 2004 on a video meeting and summarized in technical note
- For the next steps we will need the results of
 - IR design studies
 - D1 development



FY2004 IRQ R&D: Q3



Evaluation of possibilities and limitations of different magnetic and mechanical structures for shell-type and block-type coils

- Mechanical analysis of large-aperture shell-type quad has been started
 - The status, plan and technical details will be presented by Giorgio Ambrosio
- LBNL contribution:
 - Studies of IR quad mechanical structure based on bladder technology
 - Schlomo Caspi
 - Study of racetrack quadrupole – Paolo Ferracin



FY2004 IRQ R&D: Q4



Development of a conceptual design of the first quadrupole short model

- Magnetic design concept
- Mechanical design concept
- Quench protection
- SC strand and cable
- Structural materials
- Discussions and decision:
 - BNL/Fermilab/LBNL video meeting,
 - next LARP meeting or special workshop (August-October)



Technology development



The main goal for the IRQ development:

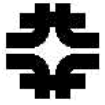
- Strand and cable parameters for the first IRQ short model

Fermilab FY2004 plan:

- Strand I_c , RRR, M, stability for RRP 0.8(1.0?) mm strand
- Strand sensitivity to cable packing factor and keystone angle
- Strand sensitivity to cable compression
- Cable inter-strand resistance

Issues:

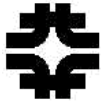
- coordination of technology development plans with IRQ magnet R&D
- coordination of Fermilab and LBNL plans and activities



Miscellaneous



- Contribution to D1 studies:
 - Alternative design with mid-plane spacers
 - D1 thermal analysis (TD-03-035)
 - No further plans
- Radiation studies:
 - Liquid polyimide study (Matrimid 5292)
 - Material radiation strength review (TD-03-053)
 - Next steps:
 - continuation of liquid polyimide (Matrimid 5292, etc.) study
 - cyanate ester/epoxy (by CTD, HUNSTMAN, etc.)



FY2005 plan and budget



Plan:

- start the engineering design of the 1st quadrupole short model and tooling
- continuation of the conceptual design studies of the double-aperture IR quad

Budget: 627k\$

- 370k\$(2.5FTE)+250k\$(M&S)+7k\$(travel)

Issues:

- Low (insufficient) level of FTEs!



FY2006 plan and budget



Plan:

- short model parts and tooling design and procurement
- fabrication and tests of practice coils and the mechanical model
- fabrication and tests of the 1st simplified (2-layer) short model

Budget: 1,925k\$

- 1310k\$(9.6FTE)+600k\$(M&S)+15k\$(travel)

Issues:

- Jump from 2.5FTE to 9.6FTE!