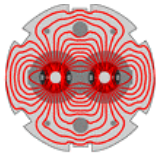


LARP

Block-type quadrupoles for a "quad-first" IR

Paolo Ferracin

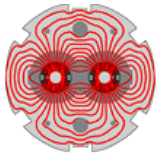
LARP Collaboration Meeting

Port Jefferson

April 6 - 8, 2005

Outline

- Task goals
- Progress
- Topics to be addressed
- Cost and schedule



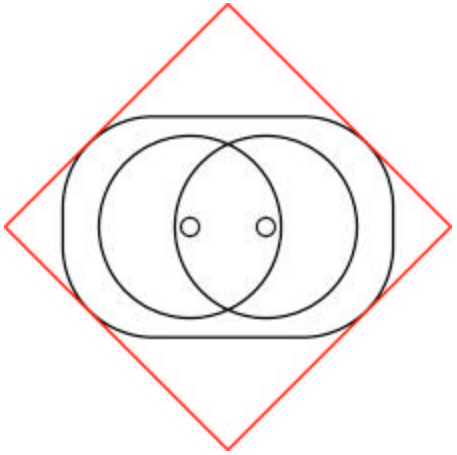
LARP

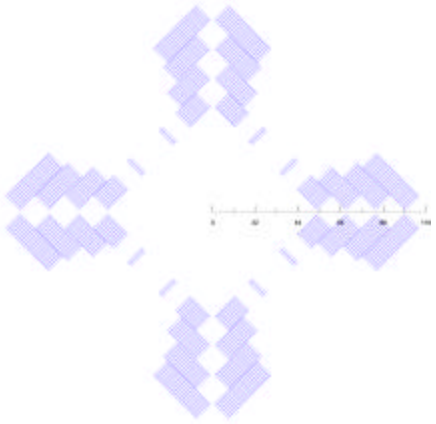
Task goals

- Investigate racetrack quadrupole magnets for an LHC "quad-first" luminosity upgrade application
- Analyze requirements for a "quad-first" scenario
  - Accelerator physics
    - Aperture and beam envelope
  - Magnetic design
    - Gradient and field quality (systematic and random errors)
  - Mechanical design
    - Coil pre-stress and support structure
  - Energy deposition
    - Absorber and LHe channel
  - Quench protection
- Design a racetrack quadrupole magnet which meets all the requirements

Progress

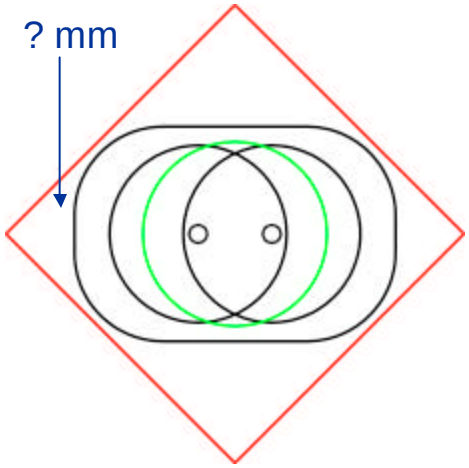
- Comparison analysis between racetrack-type and shell-type quadrupole magnets (task 2.1.1.1)
  - Choice of luminosity upgrade scenario (***LHC Project Report*** 626 (2002))
  - Beam envelope – coil aperture
  - Magnetic design
  - Mechanical design

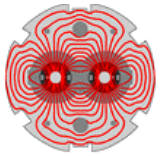




Topics to be addressed

- Energy deposition study
  - For a given upgrade scenario
    - Heat deposition on the coil
      - Effect on coil temperature margin
    - Radiation dose
      - Effect on component lifetime
  - Design of absorber and LHe channel
    - Peak power density below quench limit with safety margin (about factor 3)
    - Radiation dose within limits (to be established)
- Beam envelope / coil aperture analysis
- Second iteration on magnetic / mechanical design
- Second iteration on quench protection





LARP

Cost and schedule

- Energy deposition study
- Beam envelope / coil aperture
  - Time: FY06, Q1/Q4 Cost: 0.2 FTE, 36 k$

- Second iteration on magnetic / mechanical design
- Second iteration on quench protection
  - Time: FY06, Q1/Q4 Cost: 0.1 FTE, 18 k$

- Total: 54 k$