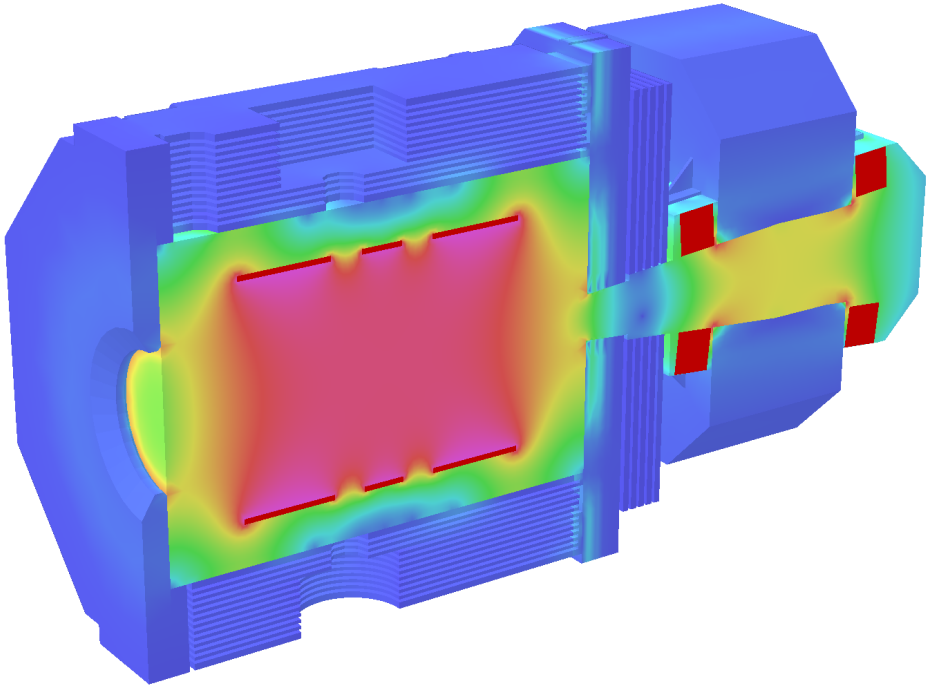
PANDA Magnets

Template for presentations concerning the magnet design at PANDA

Spectrometer Magnets at PANDA

- Prerequisite for momentum reconstruction and PID
- Ideal combination
  - 2T central solenoid field
  - 1T forward dipole field
- Technical Design Report (reviewed May 2009): arXiv:0907.0169



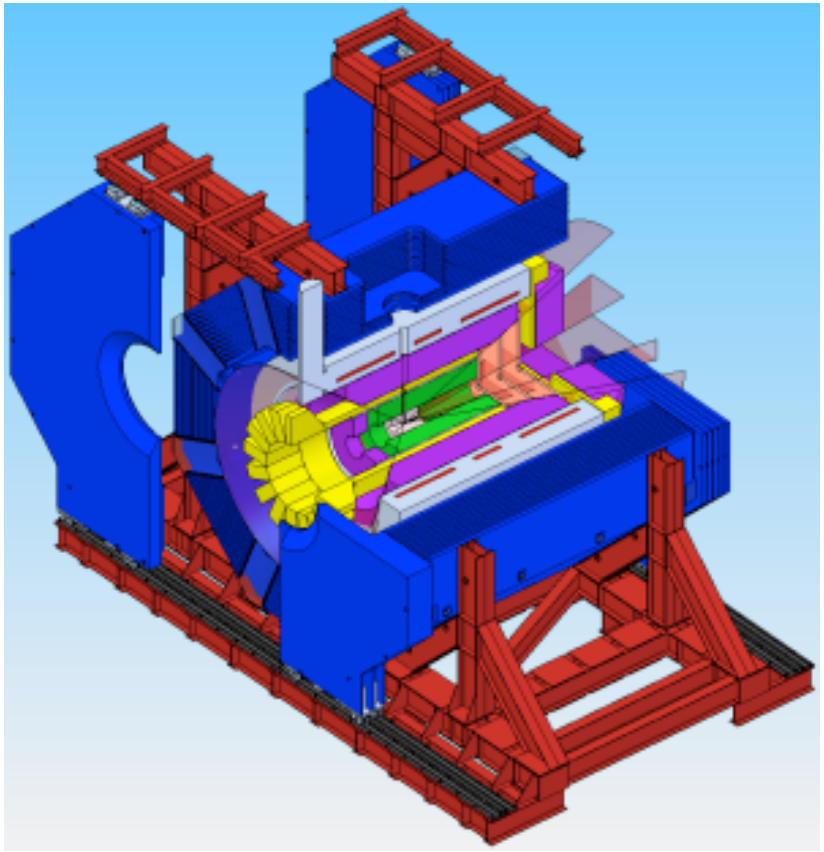
Superconducting Solenoid

- Challenges
  - 2T field
  - 4m x 1.9m free space
  - High field homogeneity
  - Target pipe intersection
  - Access on both sides
  - Movement by 20m
  - Muon range system

Central field	2.0 T
Field homogeneity	≤2%
Norm. radial field integral	≤2 mm
Inner bore	1.9 m
Cold mass parameters	
Length	2.7 m
Energy	20 MJ
Current	5000 A
Weight	4.5 t
Cable cross section	3.4×2 mm^2
Current density	59 A/mm
Yoke parameters	
Length	4.9 m
Outer radius	2.30 m
Iron layers	13
Total weight	300 t

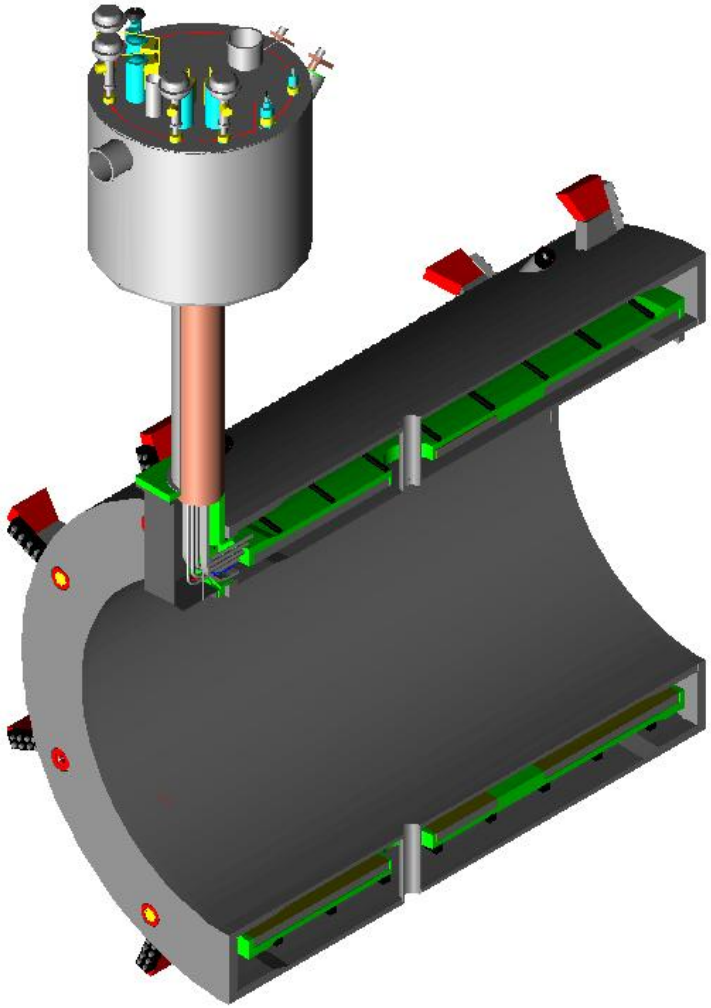
Superconducting Solenoid

- Flux Return Yoke
  - shape homogeneous field
  - muon range system
    - barrel: 13 layers
    - forward doors: 5 layers
  - opening doors
  - accommodate target
  - retractable to parking position (20m)
  - reproducible positioning



Superconducting Solenoid

- Coil
  - Internally wound on mandrel
  - Al stabilised Rutherford cable
  - split coil: 3 sections allowing target intersection
  - indirect cooling
- Cryostat
  - asymmetric warm bore
  - mounting structure for detectors



Large Aperture Dipole

- 2Tm for particles scattered in 0 – 10^{o} (5^{o} vertical)
- Allows momentum resolution <1%
- Large aperture (1x3m) and short length (2.5m)
- Ramping capability due to lamination

Field integral	2 Tm
Bending variation	≤ ±15%
Vertical Acceptance	±5°
Horizontal Acceptance	±10°
Ramp speed	1.25%/s
Total dissipated power	360 kW
Total Inductance	0.87 H
Stored energy	2.03 MJ
Weight	220 t
Dimensions (H × W × L)	3.88 × 5.3 × 2.5 m^3
Gap opening (H × W)	0.80 – 1.01 × 3.10 m^2