Work For Others

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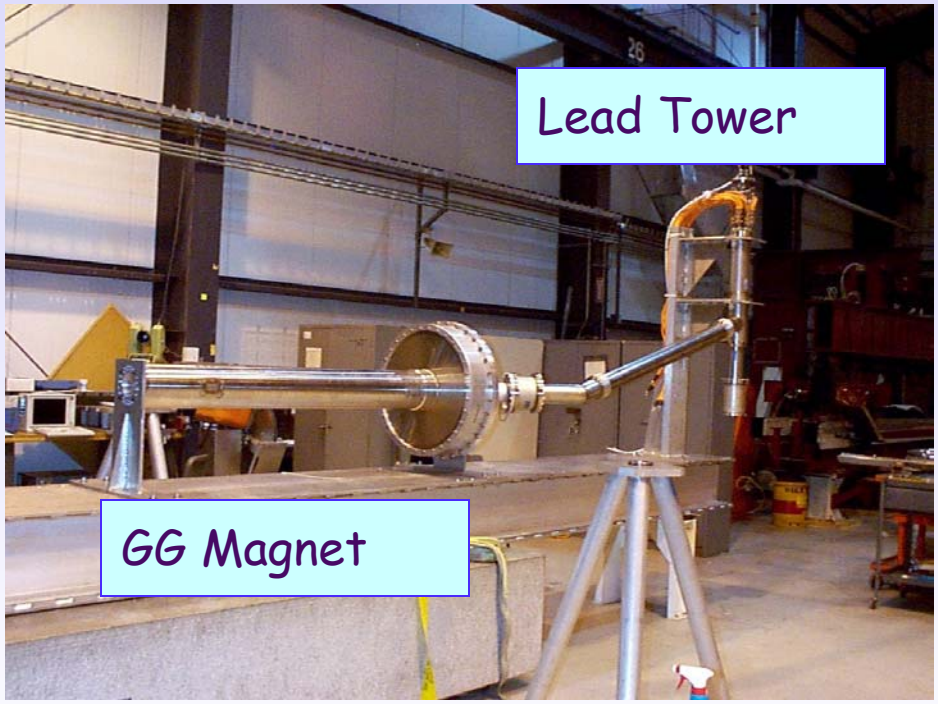
- DESY - HERA
- GSI – Darmstadt
- BEPC-II – IHEP
- ALPHA – CERN
- DANAE

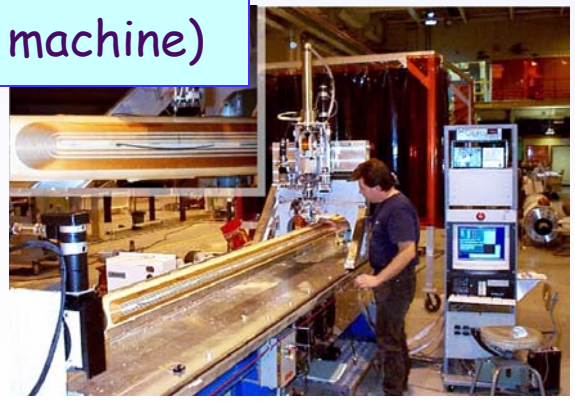
DESY – HERA, Hamburg, Germany

- 1st Major Direct Wind Magnet Program
- Single layer, single pattern coils (lots of splices)
- No iron (magnets go inside detectors)
- "novel" support system
- 2 Types (GO, GG) x 2 IP's + spares = 6 Magnets Total
- GO:
  - 3M long, constant diameter
  - 1 layer of dipole
  - 3 layers of quad
  - 1 layer of correctors (side by side skew dipole / skew quad)
  - 1 layer of sextupole
- GG
  - 1M long, tapered coils / helium vessel /heat shield / cryostat
  - 2 layers of quad
  - 1 layer of dipole
  - 1 layers of corrector (skew dipole / skew quad)
  - 1 layer of sextupole
- Self-contained cryogenics & power leads (in appended towers)

DESY - HERA

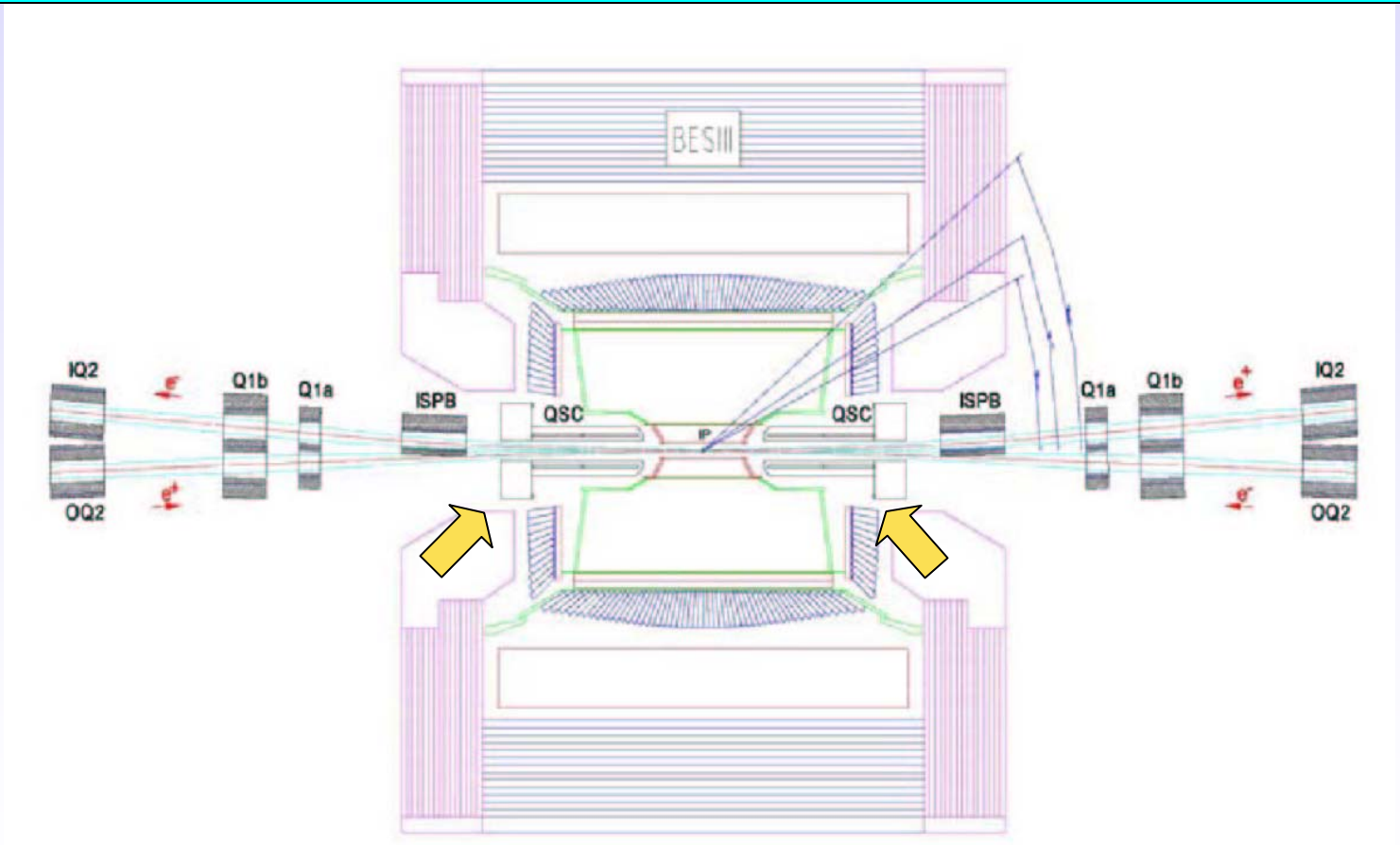


Coil Winding
(new 3M machine)



BEPC-II – IHEP, Beijing, China

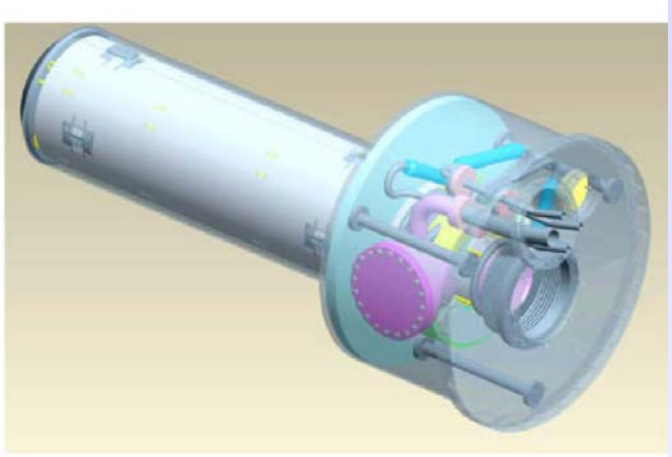
(another) no-iron, direct wind magnet inside a detector in the IP



BEPC-II

Table 3.2: Coil Winding Layout Table

Name	Number of Layers	Conductor
SCQ	8	7 Strand cable
SCB (HDC)	2	7 Strand cable
VDC	2	Single strand wire
SKQ	2	Single strand wire
AS1	6	Rectangular Wire
AS2	2	Rectangular Wire
AS3	6	Rectangular Wire



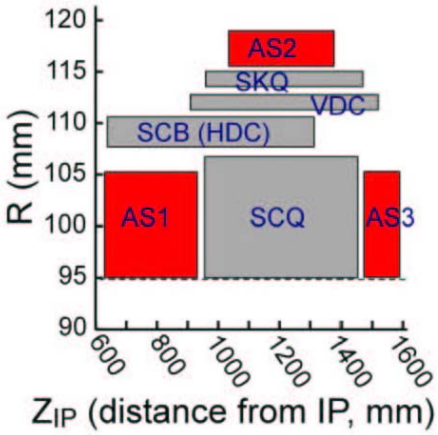
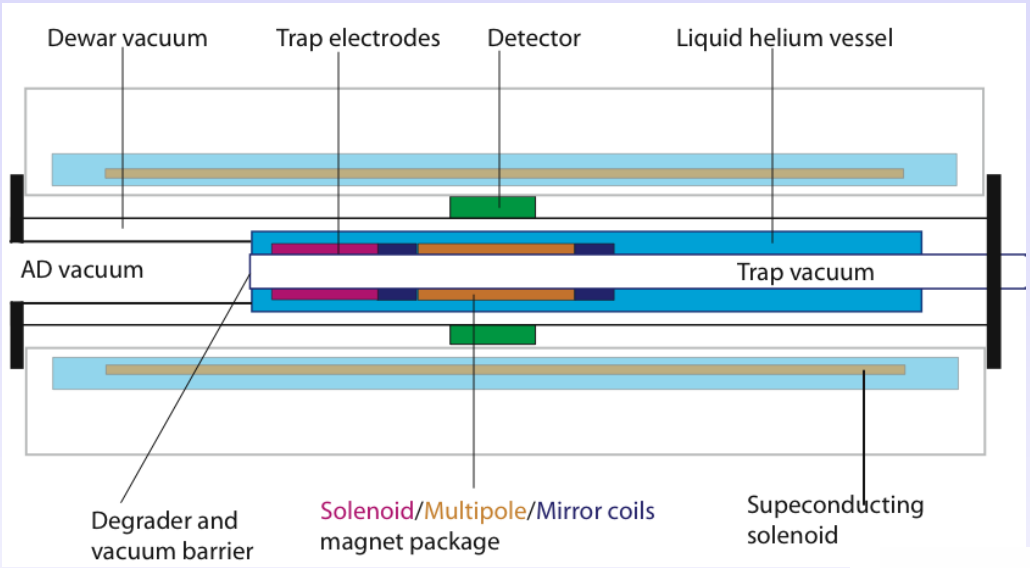


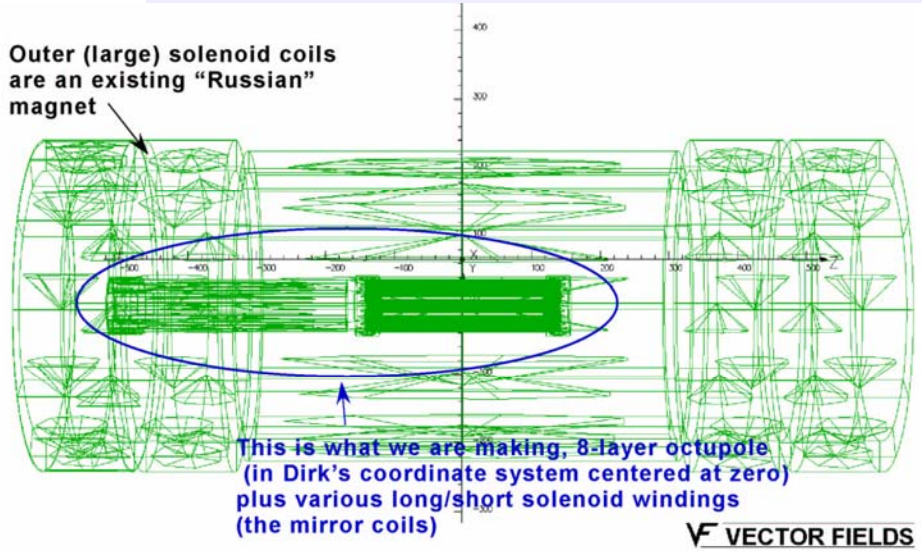
Figure 3.1. Coil Layout Schematic. *Coil dimensions, conductor type and number of layers are given in Tables 3.1 and 3.2.*

- Similar to DESY, but more complicated coil configuration
- Serpentine winding technique improved reliability, productivity
- More difficult mechanical assembly (4K and 80K cooling on inner and outer radii)

ALPHA
Anti-Proton Trap for Anti-hydrogen Laser PHysics Apparatus (CERN)



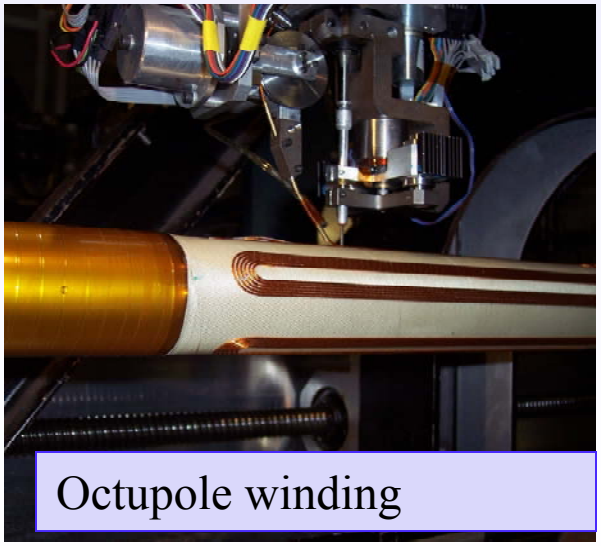
BNL supplied coils only, due to ALPHA budget constraints



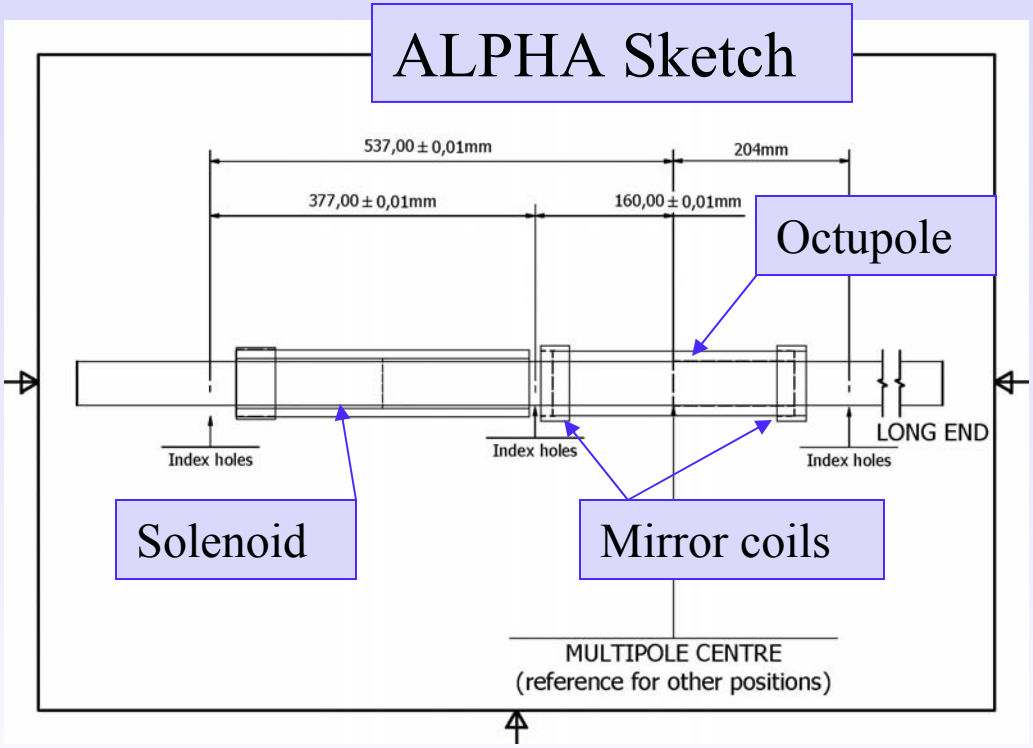
ALPHA

BNL Elements:

- 8 layer octupole
- "8+2" layer solenoid
- (2) 4 layer "mirror" solenoids



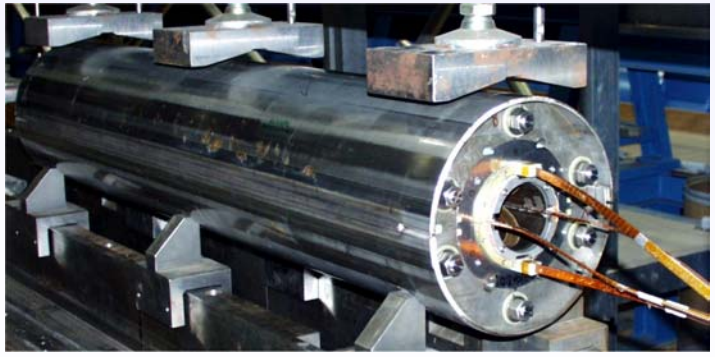
Octupole winding



Completed coil assembly

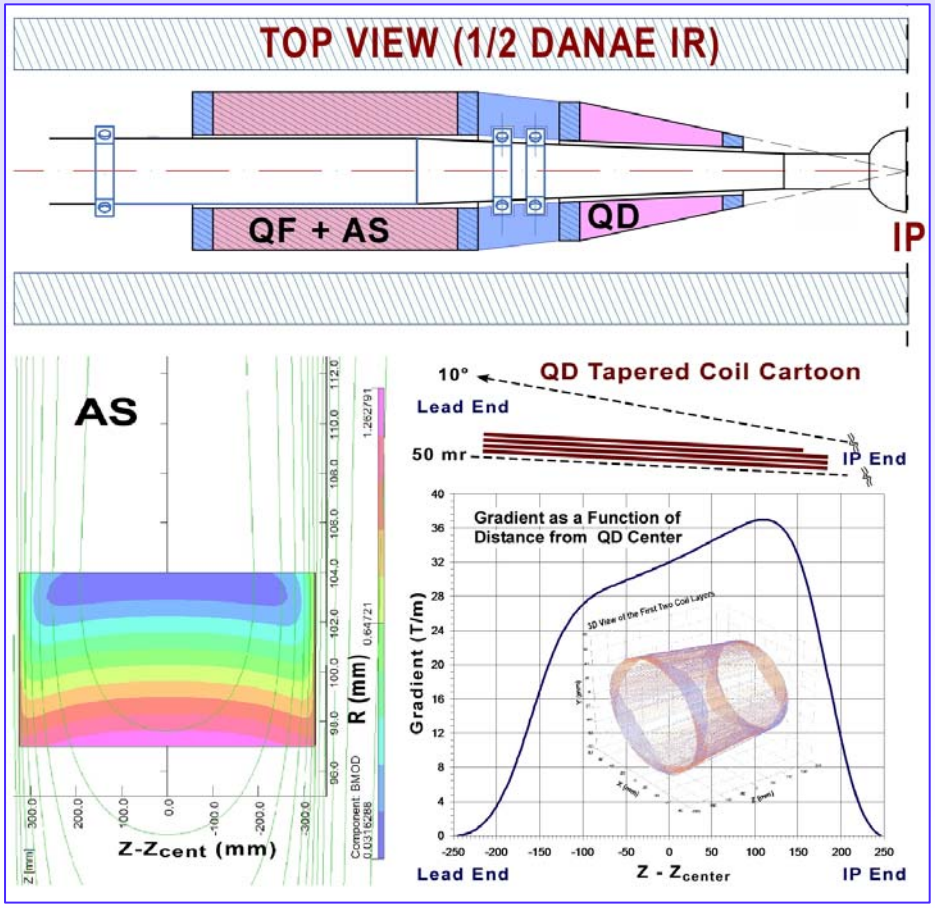
Rapid Cycling Magnet:

- Based on 8cm RHIC dipole (1M long)
- sst cable core to reduce eddy current heating
- Cuts in cable insulation to facilitate cooling
- 0.5mm coated yoke lams
- G-10 sleeves to eliminate eddy current paths
- Built & tested with and without iron



DANAE – (DAfne New Adjustable Energy)

Proposed Upgrade of Dafne at Frascati Lab, Italy



Summary

- DESY – first established the significance of the direct wind style magnets for IP applications
- BEPC-II – improved the technology
- GSI – new capability for fast ramp magnet applications
- ALPHA – the phone keeps ringing for direct wind magnets
- DANAE – and ringing…