

SoLID Magnet

The SoLID Solenoid Magnet utilizes the superconducting CLEO-II coil, cryostat and a modified iron yoke to produce a field primarily in the beam direction. The magnet will provide magnetic field for tracking and background shielding. The SoLID magnet is defined by the requirements of the spectrometer to have large acceptance in polar angle, azimuthal angle, and momentum acceptance, and also operate at high luminosity.



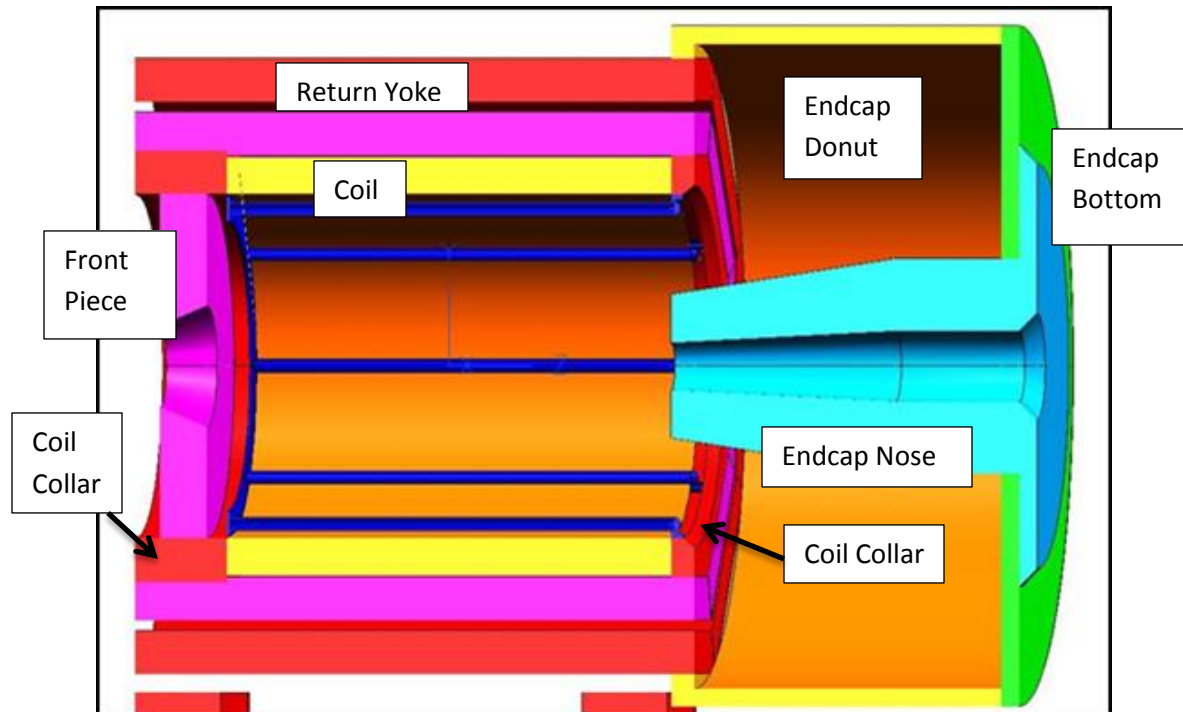
CLEO-II

Technical Parameters

PARAMETER	DESIGN VALUE
Magnet Type	Solenoid
Number of turns in coil	1281
Coil Structure	2 layer helical wound in 8 welded lengths
Conductor	5 mm x 16 mm Aluminum stabilized, 11 strand Cu-Nb-Ti
Nominal Current (A)	3266
Current Density (MA/m)	1.2
Required Field (Tesla)	>1.35, CLEO-II at 1.5T
Field Integral BdL (T-m)	5
Outer Diameter Limit (m)	3
Clear Bore (m)	2.9
Length (m)	Coil = 3.5, Cryostat = 3.8
Fringe Field Limit (G)	< 5G at polarized target
Inductance (H)	4.6
Stored Energy (MJ)	25
Cooling Mode	700 liter liquid Helium dewar using thermal-syphon circulation
Insulation	high vacuum, liquid Nitrogen cooled radiation shield, superinsulation
Total weight (tons)	1300 with detectors
Acceptance	azimuthal angle = 2π , polar angle = 8° to 24° for SIDIS and 22° to 35° for PVDIS
Momentum Range (GeV)	1 to 7
Momentum Resolution	2.0%

Modifications

- Utilizing 2 of 3 Return Yoke layers. Each layer composed of eight 36cm thick sections. Each slab to be shortened for positioning of Endcap.
- Modify or new downstream Coil Collar to allow all acceptance angles.
- New Endcap
- New Front Piece and Shield Plates



Project Status

- Agreement with Cornell to acquire CLEO-II Solenoid, Power Supply and relevant hardware
- 2D simulations complete. Analysis needed to complete downstream Coil Collar design and shielding plate requirements. 3D analysis to be done in FY16