Magnet Maps

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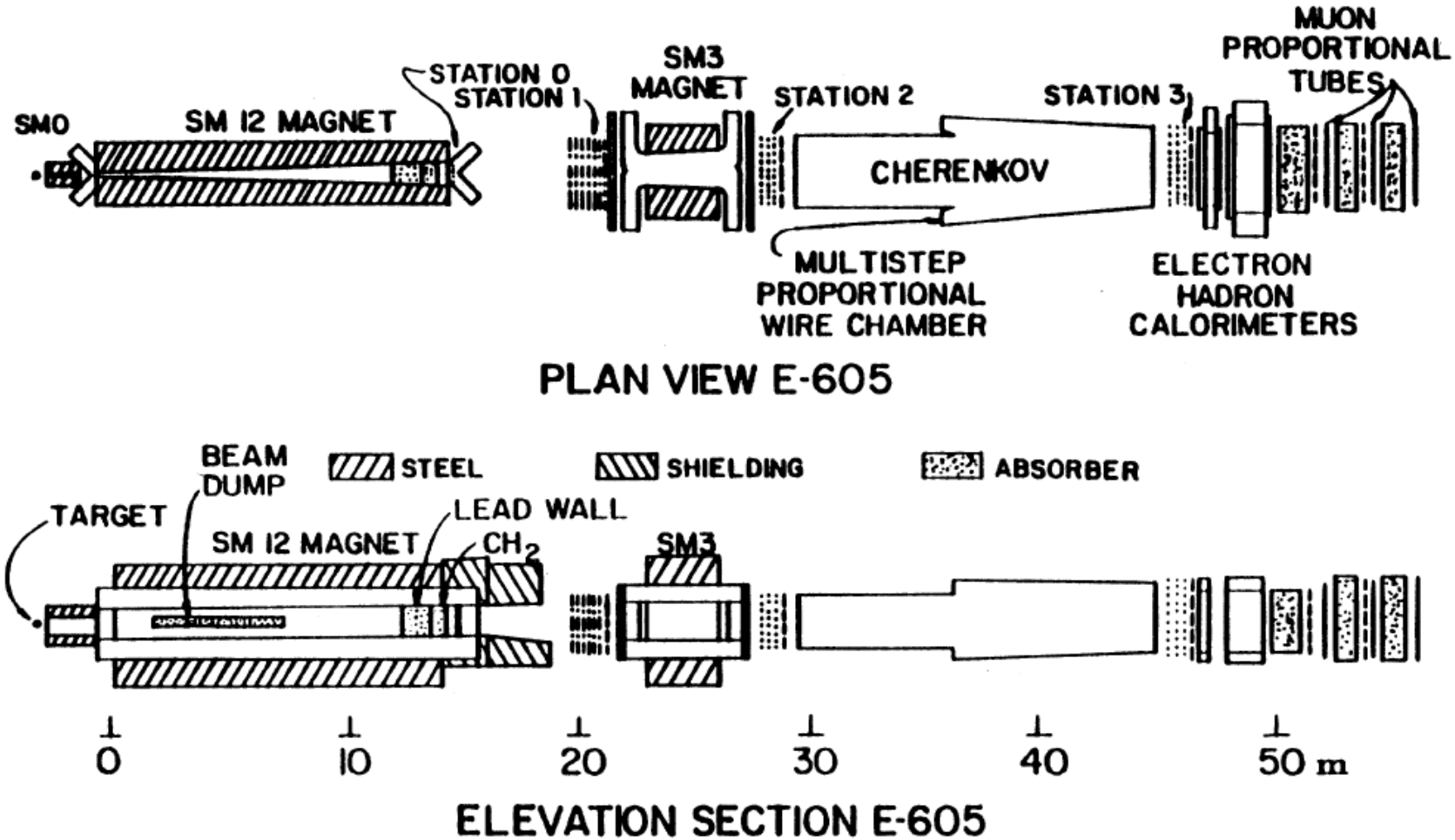
Los Alamos, January 8, 2009

Outline

- Measurement of the magnetic field for E789/866
- Field maps for E866 analysis/simulation codes
- Issues of magnetic field maps for E906

Meson-East Spectrometer



Measurement of the magnetic fields

Ziptrack

Magnetic Field Mapping System

From: http://mipp-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=196&version=1&filename=Ziptrack_presentation_2.pdf

Current Ziptrack System

- Proven to be a very reliable precision system
- Camac based control
- Designed and built at Fermilab
- Working volume
  1.5 m x 1.5 m x 12 m
- Measurement rate
  2 points/second

From: http://mipp-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=196&version=1&filename=Ziptrack_presentation_2.pdf

Digital Teslameters in Current System

- Measuring ranges
  0.3, 0.6, 1.2, 3.0 Tesla

- Accuracy
  +/- (.01% reading + .006% full scale)

From: http://mipp-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=196&version=1&filename=Ziptrack_presentation_2.pdf

Current Positioning System

- 5 absolute encoders for position read back

- Positioning resolution
  XY 12 um
  Z 180 um

- Positioning repeatability
  XY 50 um

From: http://mipp-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=196&version=1&filename=Ziptrack_presentation_2.pdf

Ziptrack Upgrade Plans

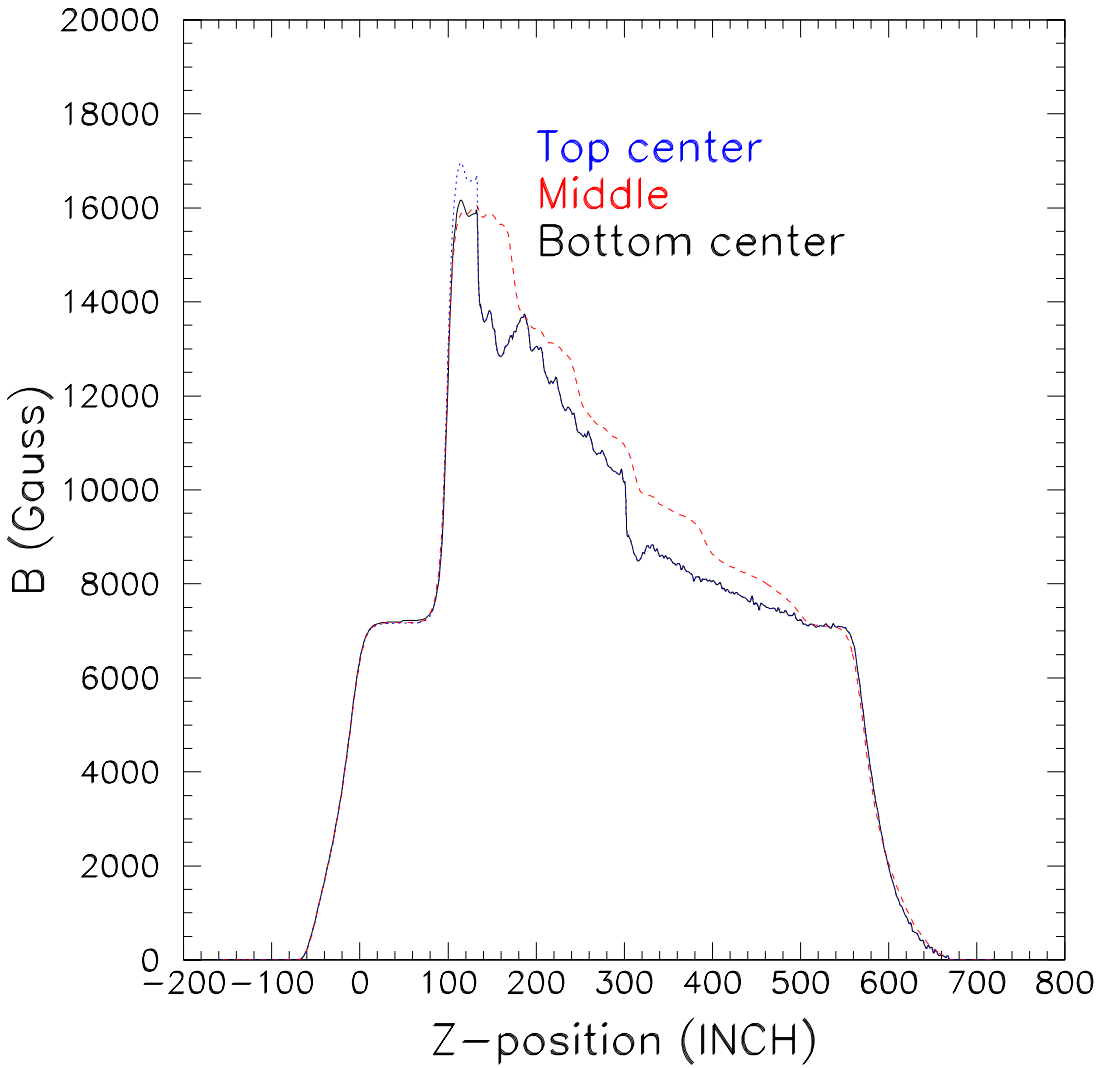
- Dell Inspiron E1705 computer system
- LabView software
- Ethernet based system for signal transmission
- New motion controllers, stepper drivers, and power supplies
- All new motor drive and encoder read back cables
- Three-axis hall probe – will allow measurement of all three magnetic field components at a single point
- Renishaw tape scale linear encoder – will improve cart positioning accuracy

From: http://mipp-docdb.fnal.gov/cgi-bin/RetrieveFile?docid=196&version=1&filename=Ziptrack_presentation_2.pdf

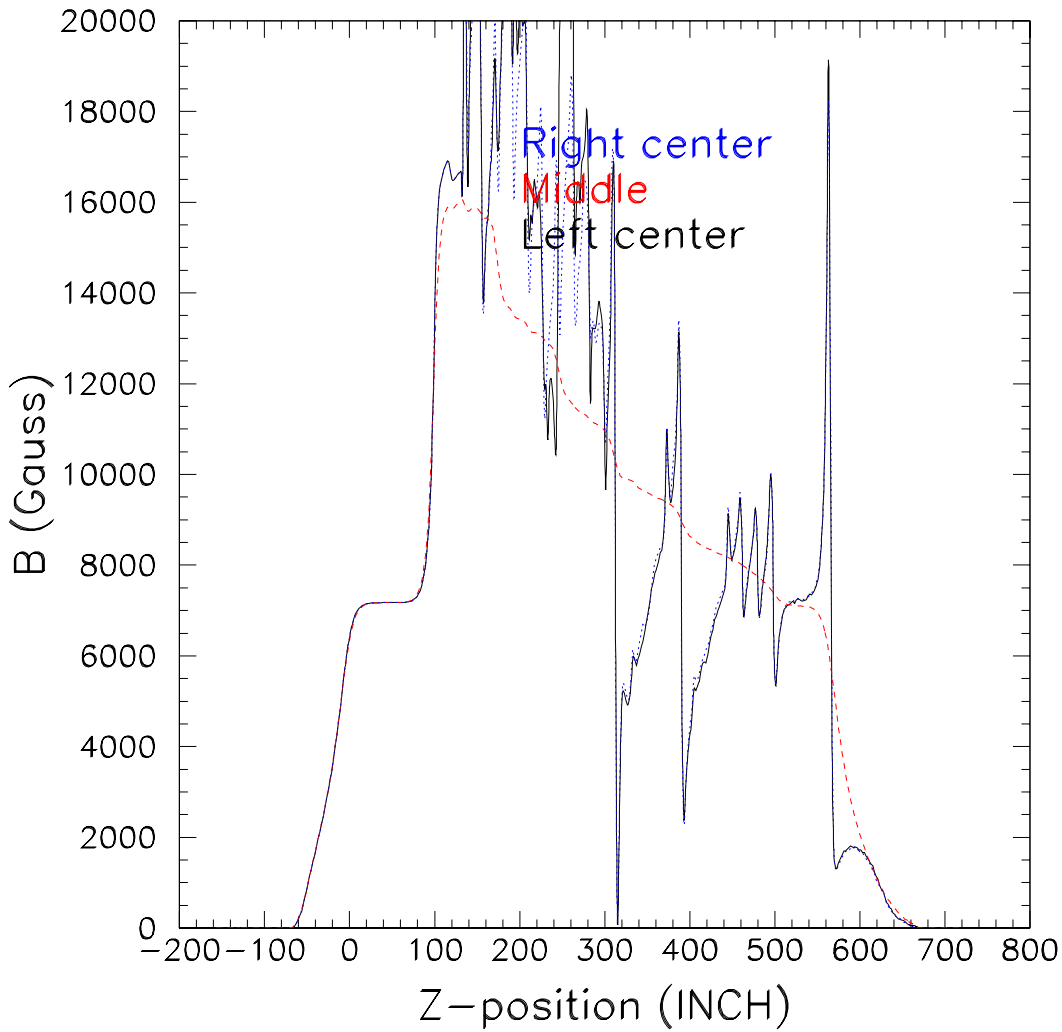
SM12 Field Map

- Stored in the array BMAP (438,33,33)
- -158” < Z < 716”
- -32” < Y < 32”
- -32” < X < 32”
- 2-inch grid

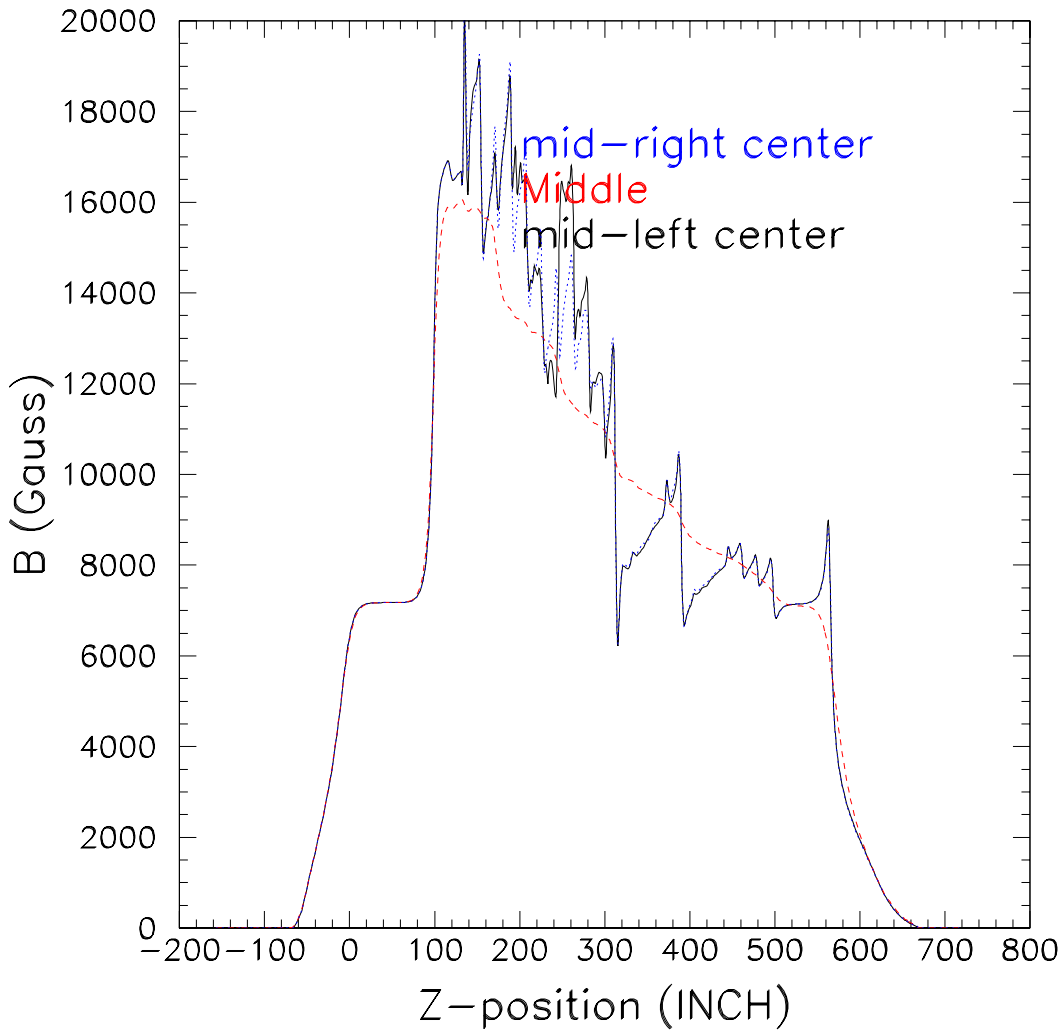
SM12 Field Map for Bx0_2800_mergeop340



SM12 Field Map for Bx0_2800_mergeop340



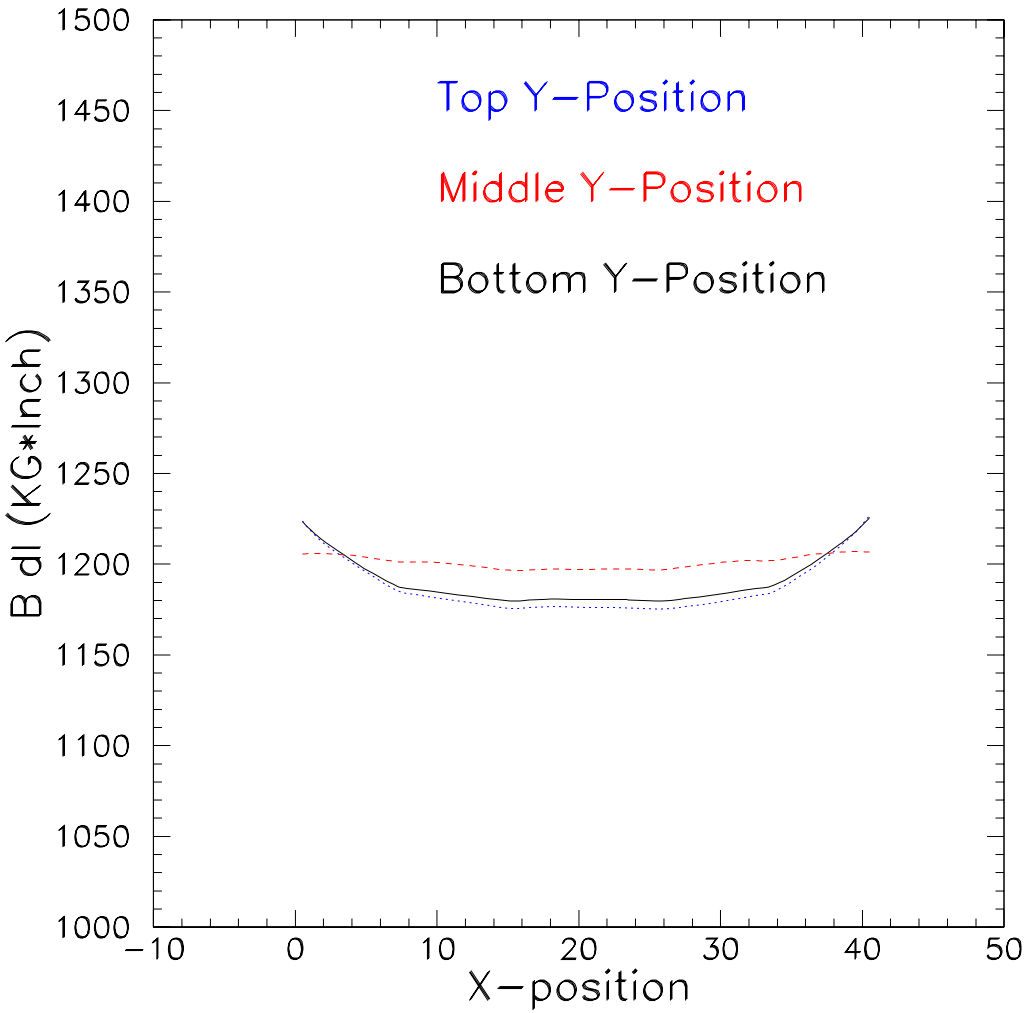
SM12 Field Map for Bx0_2800_mergeop340



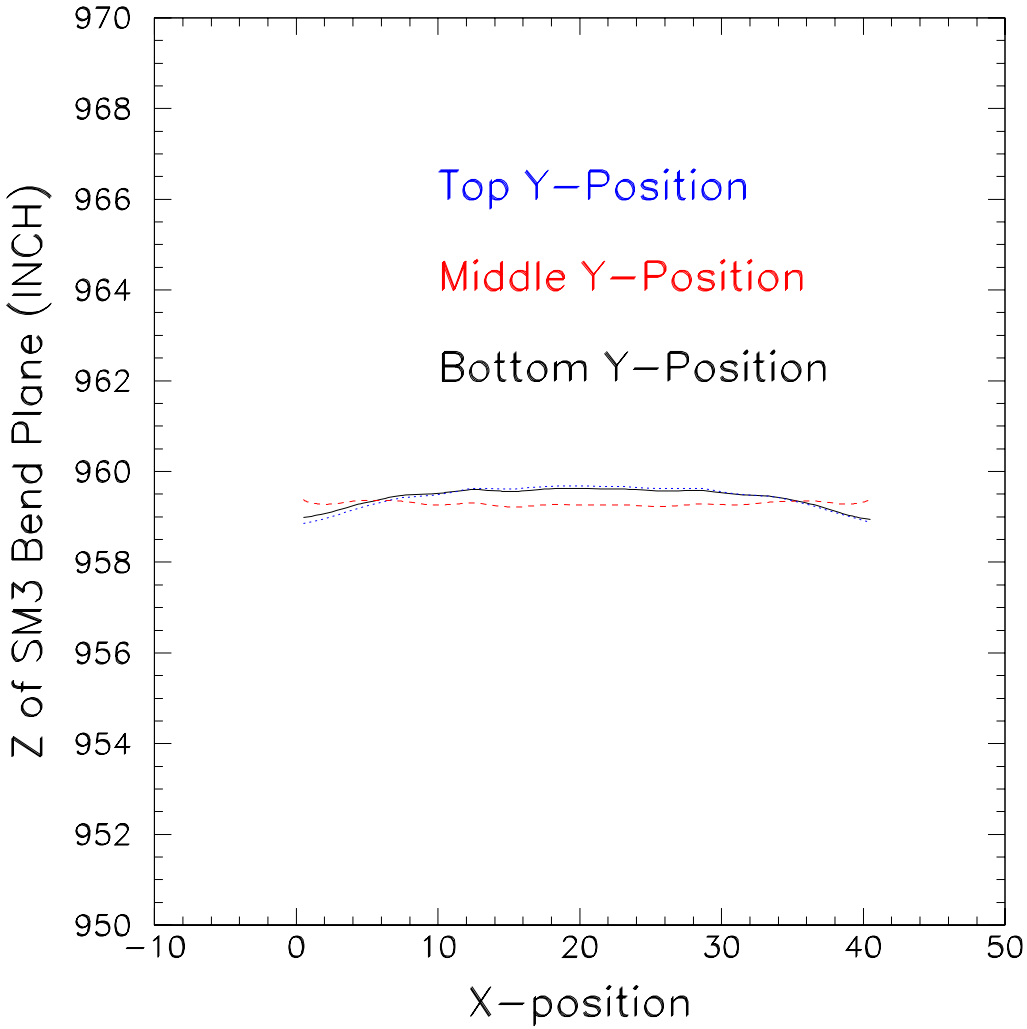
SM3 Field Map

- Stored in the array FI3 (-20:20,-20:20,2)
- X from (-20)x1.125” to (20)x1.125” in step of 1.125 inch
- Y from (-20)x1.305” to (20)x1.305” in step pf 1.305 inch
- First value is Bdl (unit of KG*inch)
- Second value is the Z-position of the bend plane

SM3 B*dl


Top Y−Position
Middle Y−Position
Bottom Y−Position
B dl (KG*Inch)
X−position
1500
1450
1400
1350
1300
1250
1200
1150
1100
1050
1000
−10
0
10
20
30
40
50

SM3 Bend plane



Tasks for E906

- Ziptrack measurement for the KTeV magnet
  - Should we generate a more detailed field map than the SM3 magnet?
- How to obtain an accurate field map for the FMAG magnet?
  - Calculation using OPERA?
  - Fringe field measurement?