

Field Mapping Plan for D2n

Preparation

1. Request survey group to measure the alignment of the Helmholtz coils if this is not done yet. Place a laser pen parallel to the beam line to determine the x,y position of the probe (set it most close the pivot to do this measurement). Use the upstream beam pipe window as the reference z position to determine the z position of the probe.
2. Check stabilities of all power supplies. Make sure polarities can be switched remotely. Mark current direction for all coils.
3. Do zero calibration to the probe before it will be mounted to its holder. **Get some mu-metal to MAKE a zero field hole to do this calibration.**
4. Develop some excel templates, or a program, to calculate gradients.

Based on my experience, we should measure at lease the following 4 lines (20 points):

```
x y z
0 0 20
0 0 10
0 0 0
0 0 -10
0 0 -20
0 10 20
0 10 10
0 10 0
0 10 -10
0 10 -20
10 0 20
10 0 10
10 0 0
10 0 -10
10 0 -20
-10 0 20
-10 0 10
-10 0 0
-10 0 -10
-10 0 -20
```

Lets call this 4-line-checkout.

There is a simplified version of this checkout, which contains only one line:

```
x y z
0 0 20
0 0 10
0 0 0
```

0 0 -10
0 0 -20

Lets call this 1-line-checkout. 1-line-checkout will be used during the current-scan for vertical coils and HB coils.

Mapping

Assume the SHMS is at 14.5 deg.

1. Measure the background (5 min)

Do 1-line checkout for background field (at least once per day). If the spectrometer angle changed, repeat this. (5 min)

2. Measure all single coils for calibration (100 min + 120 min)

2.1) HB: set it to maximum momentum, do 4-line-checkout. If spectrometer angle changes, repeat this. (20 min)

2.2) HS(in Z direction): set the current to 7.3A. Do 4-line-checkout. Put the current at opposite then repeat. (Use positive map to minus negative map we can remove the background.) (40 min)

2.3) HL(in transverse direction): set the current to 7.4A. Do 4-line-checkout. Put the current at opposite then repeat. (Use positive map to minus negative map we can remove the background.) (40 min)

The following 2 step can be skipped if time is not allowed.

2.4) VS: Do 4-line-checkout at +/- 6.0A. Do current scan (1-line-checkout) for the following currents: 1,2,3,4,5,6,7,8. In this step, for a given location, scan the current using power supply then move to next location. Prepare 2 figures: "Averaged_By_gradient vs I ", "Averaged_By vs I". (60 min)

2.5) VL: Do 4-line-checkout at +/- 6.0A. Do 1-line-checkout for the following currents: 1,2,3,4,5,6,7,8. In this step, for a given location, scan the current using power supply then move to next location. Prepare 2 figures: "Averaged_By_gradient vs I ", "Averaged_By vs I". (60 min)

3. Measure HB for other spectrometer angles (40 min)

Change to the following spectrometer angles: 8.5 deg, 11.0 deg. repeat 2.1).