Fwd: Re: New XTA Spectrometer Dipole 12D13.5

Monday, March 26, 2012
9:51 AM

Subject	**Fwd: Re: New XTA Spectrometer Dipole 12D13.5**
From	Dieter Walz
To	Anderson, Scott D.
Cc	Limborg, Cecile G.
Sent	Monday, December 12, 2011 3:59 PM

Hello Scott,

Cecile and I met on Friday and to round out the measurements program for the XTA spectrometer.

After completion of the wire integrated strength measurements as function of current at x=0, we would like to do wire x-scans for the x-range and currents below. The desired beam energies are 8 MeV, 85 MeV, and 100 MeV; these will require integrated strengths of 0.2096 kG-m, 2.2227 kG-m and 2.620 kG-m, respectively. Please use the excitation currents from the wire measurement at x=0.

Since we are interested in doing the Hall probe measurements at the end of the magnet in 1 cm increments, I might also want to change the integrated wire measurements as function of x from 1/2" increments to
1 cm increments, out to maybe +/- 6 cm. If this is too late, we will live with 1/2" increments as requested below.

It is quite important that we are able to cancel the remnant field after we operated the magnet in the 45 deg spectrometer mode. The magnet has trim windings which will be connected to a MCOR 6 power supply.

To quantify the field distribution near the downbeam end of the dipole using a Hall probe, we would like to have a grid of points along the 22 1/2 deg nominal exit trajectory over a range of +/- 5 cm in z and +/- 5 cm in x, and in increments of 1 cm.

If there is any other info you need to proceed, please contact me.

Greetings, Dieter

>Date: Thu, 8 Dec 2011 21:14:20 -0800
>To:
>From: Dieter Walz <dwalz@stanford.edu>
>Subject: Re: New XTA Spectrometer Dipole 12D13.5
>Cc: Cecile Limborg <limborg@slac.stanford.edu>
>Bcc: Mark Hogan <hogan@slac.stanford.edu>, Eric_Colby
><ecolby@slac.stanford.edu>

>X-Attachments:
>
>Hello Scott,
>
>here are a few numbers to get you started on the 12D13.5 XTA spectrometer.
>
>The dipole has a nominal gap of 1.000", although when Levirt and John
>measured it today, it came up a bit short at 0.980". The pole width is
>12". The effective magnetic length is ~14.5".
>
>The nominal deflection is 45 deg, and we plan to rotate the dipole
>about the y-axis by 1/2 the angle of bend, or 22.5 deg to optimally
>utilize the good field region. The saggitta is ~1.442" = 3.663 cm.
>
>Since we have designed for monitoring off-momenta to the tune of +/-
>2 deg, we had best not only measure the integrated strength at x=0,
>but also out to at least x= +/- 2" in 1/2" increments (will want to
>discuss this with Cecile in the morning).
>
>The expected resistance of the magnet based on Ron Rogers conductor
>length of 204 ft/coil is 0.07i2 Ohms.
>
>Using a maximum beam energy of 120 MeV, I expect we will need ~250 A
>excitation current (there will be just a bit of saturation evident).
>The ohmic losses for the whole magnet will be ~4.2 kW, and if we allow
>for a bulk water temperature rise of 30 deg C, the flow rate per coil
>should be ~1/4 gpm. Depending on how much water you can push through,
>we might want to go a bit higher in current to drive the magnet into
>deeper saturation for better standardization.
>
>Will see you tomorrow to discuss the other measurements, like the Hall
>probe measurements to evaluate the fringe field at the ends.
>
>This should get you started with the wire.
>
>Greetings, Dieter
>
>
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>
>>
>>

Setup

Tuesday, March 27, 2012
1:51 PM

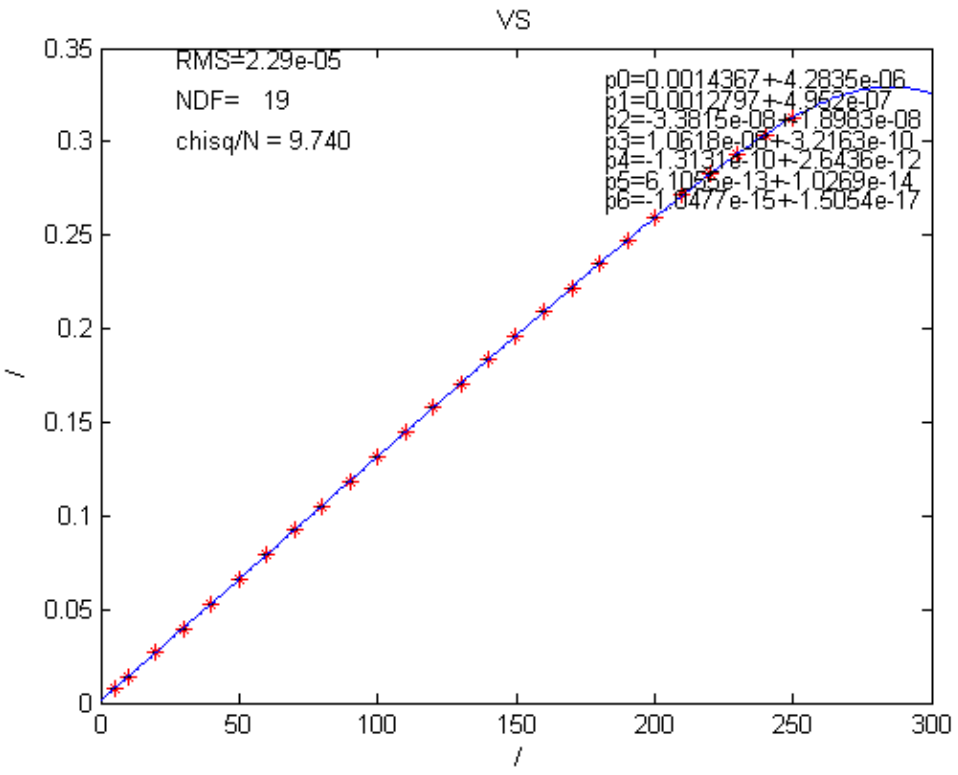
Project: XTA
Magnet Type: Dipole
Magnet Name: Spectrometer
Drawing Number: SA-235-973-50 Rev 0
Type: 12D13.5

Spectrometer dipole standardized 20 times from 5 to 250 to 5 amps before testing started to train the magnet.

At 250.032 amps PTF = 0.823 Tesla. Integrated Strength from pole tip = 0.3233 Tm.

Currents for the BL vs. X as calculated from a 6th degree polynomial for:
0.2096, 2.2227 and 2.620 kG-m.

Imag = 1.5205e+01, 1.7030e+02, 2.0219e+02.



Hall Probe Setup parameters from Dieter Walz:

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Hello Scott,

looked at my notes from an earlier magnet evaluation and
found the saggitta of the 12D13.5 dipole to be ~ 1.442" ~
3.663 cm.
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So, to do the Hall probe measurements (one end only), you will have to rotate the orientation of the measurement setup relative to the magnet by 1/2 the angle of bend, or 22.5 degrees.

The x-offset of the beam entry trajectory is then ~ 18.3 mm from the geometric center of the poles. Measuring out to +/- 5 cm should more than cover any offsets of the incoming beam trajectory, and +/- 4 cm might be enough.

Results

Wednesday, March 28, 2012
11:17 AM

Run 3 is a scan of the trim current to find the current which zeros the integrated field. The trim is scanned after the Main coils are standardized and then set to zero, but not turned off. The Main supply is not turned off due to power spikes that tend to make the zeroing scan not reproducible.

Using a linear fit for the trim scan the zeroing trim current = -1.6118 A.