SLAC Traveler for the New LCLS 'Q150kG' LTU Quadrupole Magnets

(Aug. 27, 2007)

This traveler covers mechanical fiducialization and magnetic measurements of the LCLS "Q150kG" LTU quadrupole magnets needed for the fall 2008 LCLS run. There are 12 of these red 30-cm long magnets needed for the LCLS LTU beamline, and 2 spares. These magnets were recently delivered from Everson-Tesla.

Receiving:

The following information is to be noted upon receipt of the magnets by the SLAC MFD group:

Received by (initials):	G.S.
Date received (dd-mmm-yyyy):	11/28/07
SLAC barcode number:	002614
Manufacturer's serial number on the magnet:	#007

Place a barcode sticker on the magnet and also duplicate the barcode sticker here →	002614

Preparation:

A beam direction arrow, with text "beam direction", is to be applied to the top and/or connector side of the magnet with a sticker supplied by LCLS (C. Rago will determine the direction).

Beam-direction arrow in place (initials):	ADF

Fiducialization:

Fiducialization may be d c measurements. The magnet is to be fiducialized by the CMM (DATA ANALYZED) installation of removable tooling balls, location of the geometric gnet, and location of tooling balls with respect to the center of this s are aligned precisely horizontal.

CMM technician (initials):	KC 1/15/08

URL of on-line CMM fiducialization data (please modify or correct if necessary):

\\web002\www-group\met\Quality\FIDUCIAL REPORTS\LCLS LTU Q150kG QUADS\002614.pdf

Magnetic Measurements:

Enter URL of on-line magnetic measurements data (**please fill in proper directory name**):

http://www-group.slac.stanford.edu/met/MagMeas/MAGDATA/LCLS/quad/ 002614/

1) Connect the magnet to cooling water flow (rate provided by C. Rago).

2) Assuming there are 14 total magnets, select 5 of these as "unipolar" excitation, and the rest (9) as "bipolar".

Magnet selected as (please enter one of the following): "unipolar" or "bipolar"	Bipolar

3) For all magnets, determine the connection polarity (with supply outputting positive current) which produces the (positive) field polarity shown below:

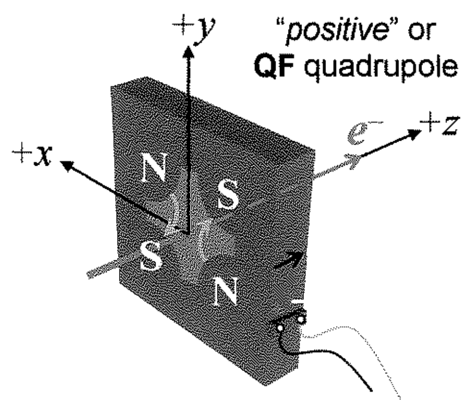

Figure 1. All of the 'Q150kG' magnets have "positive" polarity.

4) Mark the polarity near the magnet leads with clear "+" and "–" labels as shown above.

Polarity has been labeled (technician initials):	ADF

5) Connect the magnet terminals in the correct polarity as established above, to a bipolar power supply (5 magnets use only one polarity) with 120-A maximum current.

6) Run the magnet up to 80 A for ~1 hr to warm it up (record temperature).

Ambient temperature (°C):	14.89	°C
Final magnet temperature (°C):	24.63	°C

7) Standardize the magnet using excitation current limits which depend on the magnet's selection as "unipolar" or "bipolar" according to the table here:

Magnet selected as:	Min. current (A)	Max. current (A)
"unipolar"	0	120
"bipolar"	−120	+120

Standardize the magnet starting from the above "Min. current" and up to the "Max. current", and back to "Min. current", through three full cycles, finally ending at "Min. current", with a flat-top pause time (at both "Min" and "Max") of 10 seconds. Use a ramp rate of 5 A/sec, if possible, and record the ramp rate used.

Standardization complete (technician initials):	ADF
Ramp rate used (A/sec):	5 A/sec

8) Measure the length-integrated field gradient, $\int Gdl$, from "Min. current" to "Max. current" in 12 uniform current steps (10-A steps for "unipolar" and 20-A steps for "bipolar"), and then back down from "Max. current" to "Min. current" in 12 more steps.

Filename & run number of $\int Gdl$ up & down data:	stvdat.ru2

9) Confirm the pole-tip field using a Hall probe at an excitation current of +80 A.

Hall probe pole-tip field at +80 A (mean of 4 poles):	3.7 KG

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10) Measure the field harmonics at +80 A using a ≥0.8-inch diameter probe.

Rotating coil designation (coil name):	DC 34
Rotating coil radius (m):	.0088 m
Harmonics data file name:	hordat.ru2

11) **For just one magnet** (any one), please measure the effective magnetic length using a Hall probe. This procedure may require further discussion.

Filename & run number of effective length data:	—

12) Measure the inductance and resistance of the magnet:

Inductance of coil (mH):	2.65 mH
Resistance of coil (Ohms):	.0469 Ohm

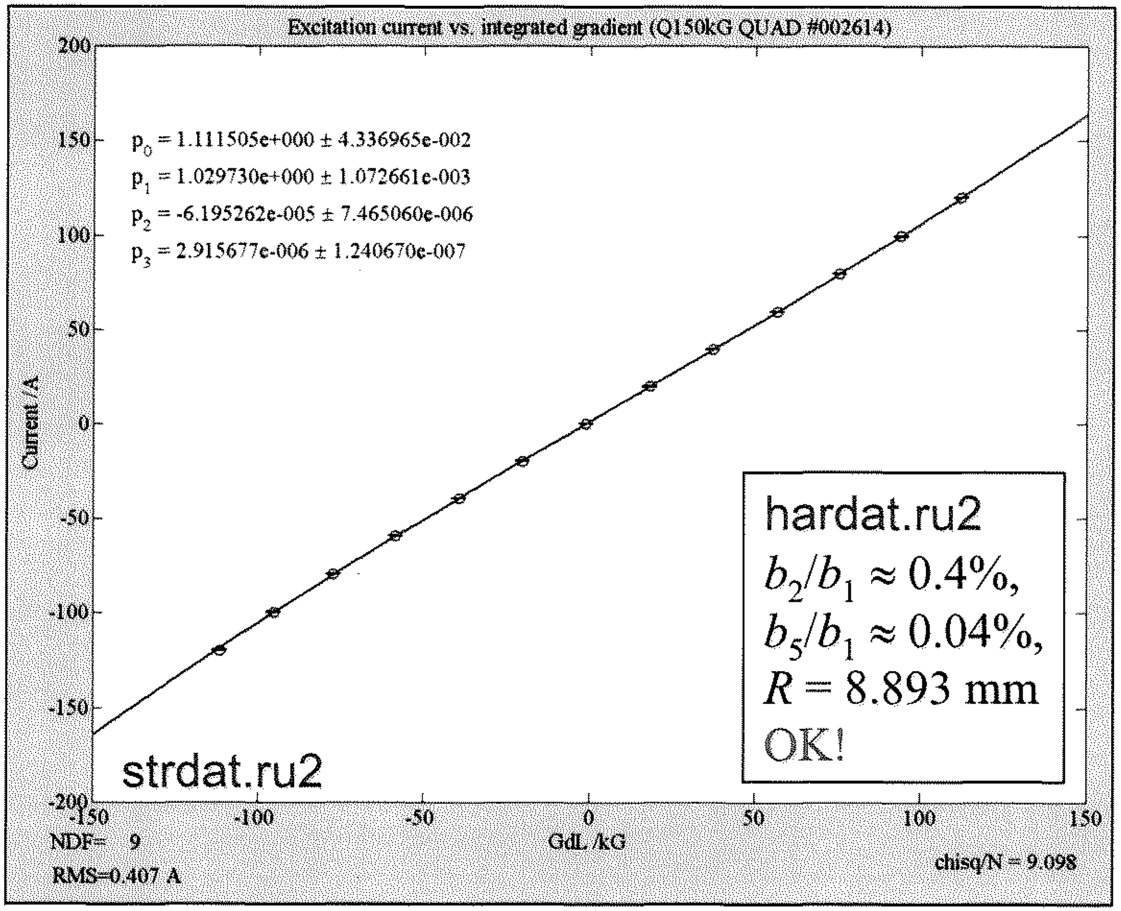
13) Upon completion of tests, send traveler to Paul Emma at mailstop 103.

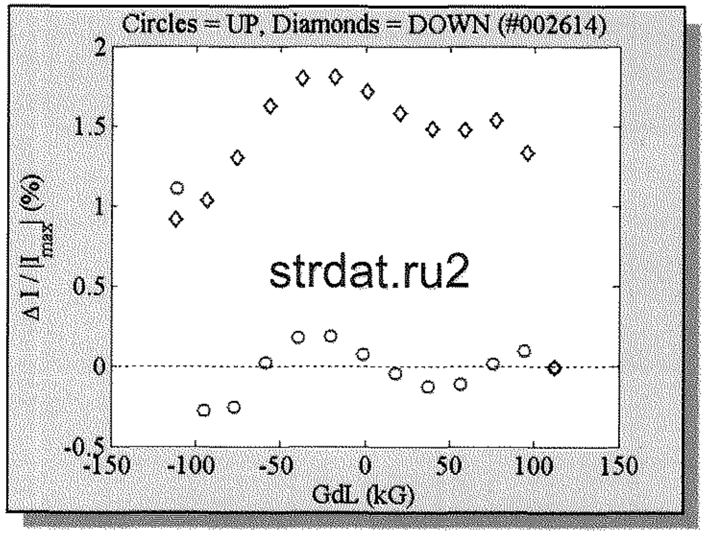
This section is to be completed by P. Emma.

Magnet accepted (signed):	Paul E
Assigned beamline location (MAD-deck name):	QUM2

14) Upon full completion, send this traveler to Kathleen Ratcliffe at mailstop 18.

Q150kG Quadrupole (measured Jan. 29, 2008)





SLAC magnet bar-code: **002614**
vendor serial number: **007** **QF, bipolar scan from MMF**
MAD assignment: **QUM2**
http://www-group.slac.stanford.edu/met/MagMeas/MAGDATA/LCLS/quad/002614/