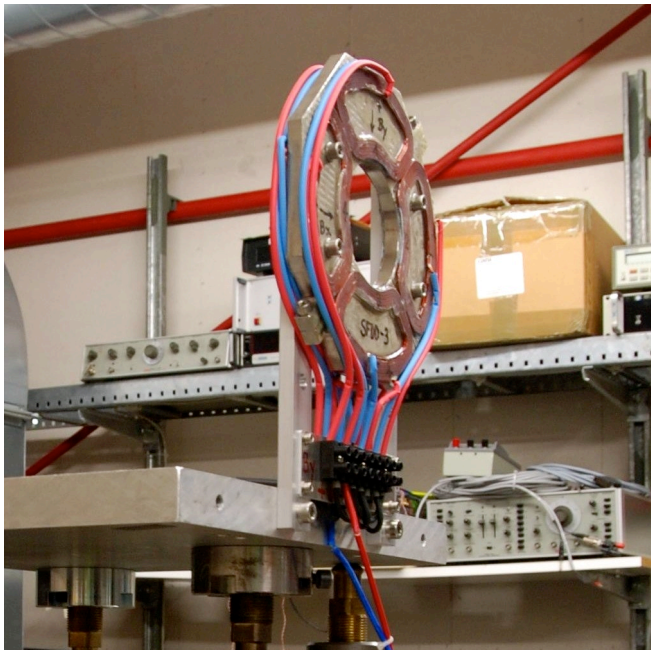
SFDD Correctors (SwissFEL 250 MeV Injector)



SFDD corrector (#3 of 3)

2R = 80 mm

L = 10 mm

I_{MAX} = 20 A

4x2=8 coils, 6 turns/coil

top & bottom for B_Y

left & right for B_X

MEASUREMENT DATE:
18–19.Mar.2009

MEASUREMENT ARM:
aluminum block standard interface
titan pipe Ø 33.4/25.6/12.8 mm

MEASURING SPEED:
4.5 mm/sec (X-axis)
1.25 mm/sec (Y-axis)
49 mm/sec (Z-axis)

INTEGRATION TIME:
20 msec

DVM-1 (1 V RANGE):
Hall probe sbv1884
(with the cap)

DVM-2 (10 V RANGE):
24 V / 10 A (MSG-2.2)

AIR CONDITIONING:
ON (T_{SET} = 24°)

OPERATORS:
Roland Deckardt
Vjeran Vranković (report)

DATA DIRECTORIES:
afs: sys/alpha_dux51/swdir/
magnet/meas/sfdd1
magnet/meas/sfdd2
magnet/meas/sfdd3

Alignment and Positioning

The magnets were fixed with 2 screws to the aluminum base plate. The plate was leveled by adjusting the feet heights.

The center of the measurement coordinate system is in the middle of the magnet. It has been found by eye - aligning the probe with the crosshairs printed out on a transparency that was sticked to the magnet.

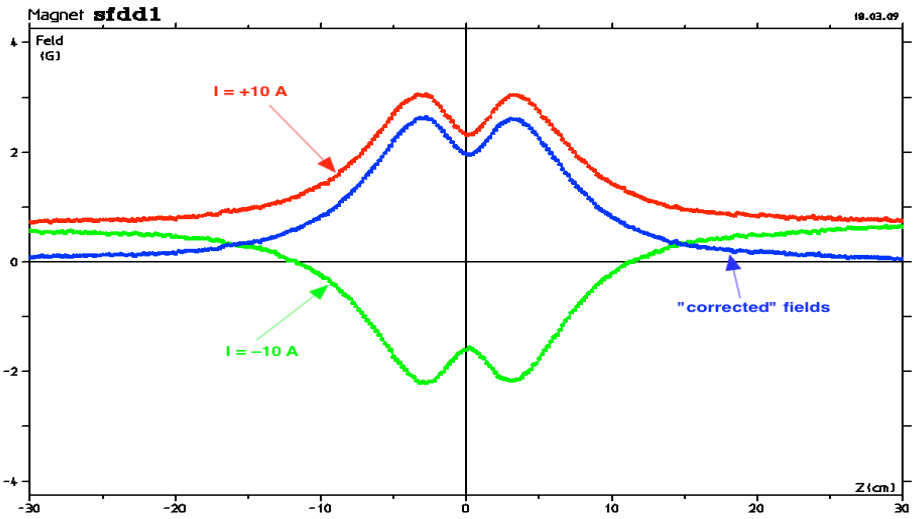
After each rotation of the probe arm (to measure B_X the arm angle is PSI=-90° and for B_Y is PSI=0°) the position of the probe is lost and the process for finding the centre had to be repeated (except for the Z position of the probe which practically does not change with the rotation of the probe arm).

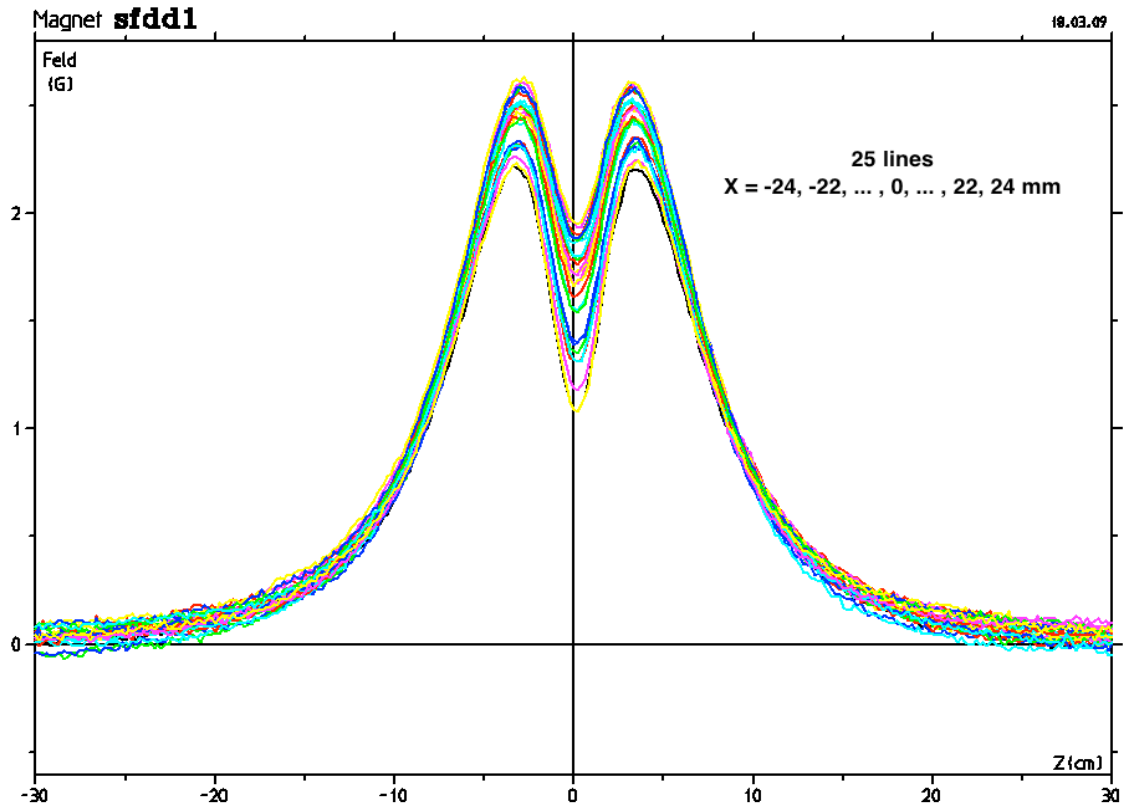
Field Analysis

The fields are very low, less than 3 Gauss at 10 A current. It is therefore necessary to remove the earth and the background fields from the measured fields:

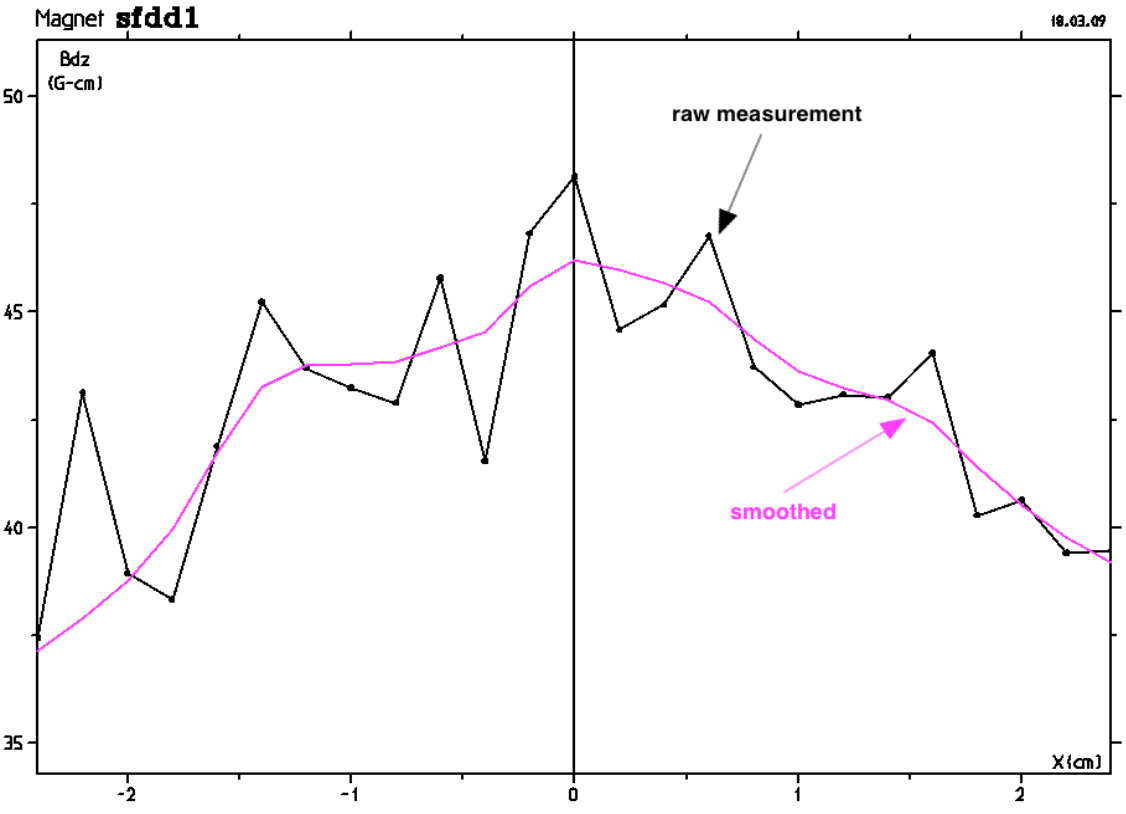
$$\frac{measurement(+current) - measurement(-current)}{2}$$

e.g. B_Y field (top & bottom coils excited, SFDD-1) along the magnet axis (X=Y=0).





The field integrals $B_Y dz$ are shown along with a smoothed curve. The measurement error is approximately ±2 Gcm (0.05 G x 40 cm).



Summary of Measurements Results

The given field integrals are averaged over 5 lines at X=-4,-2,0,2,4 mm and for the current I=10 A.

SFDD #	$B_Y dz$_Gmm	B_{Ymax}_G	$B_X dz$_Gmm	B_{Xmax}_G
1	453	2.6	444	2.6
2	452	2.6	445	2.6
3	445	2.6	449	2.6