



JRA1 PCMAG field mapping



Elements of the work:

- Hall sensors: improvements and production
- Calibration of Hall sensor cards
- Mechanical mapping device
- Installation of permanent probes
- Operation of PCMAG for the calibration
- Data collection
- Data analysis



Disclaimer



Sorry, I am just back from long holidays, had no time to collect very detailed info so far.

So this talk is rather superficial

No detailed performance figures



Hall sensors: improvements and production



- Improvements of the Hall sensors taking into account the lessons learnt from LHC field maps:
 - Modification to Hall-probe biasing circuit
 - Improvements of sensors addressing and readout
- Design and tests were carried out in Spring 2007
- 30 new 3D Hall sensors cards were produced for July 2007



Calibration of Hall sensor cards



- Prior to mounting them on the field mapper, all new sensor cards were calibrated at CERN.
- Stability observed: very close to the target value



Mechanical mapping device



Installed at the EUDET test beam in DESY, on July 19th 2007

Excellent alignment precision (<0.2 mm deviation from mechanical magnet axis).

Remote control over z-axis, manual phi-control.

Allowed to take data in ~3 days.

http://www.linearcollider.org/newsline/readmore_20070726_ftr1.html



Some photographs



<http://www-jlc.kek.jp/~ikematsu/archives/photos/pcmag-fieldmap/>





Installation of permanent probes



- 2 permanent probes are installed
 - 1 in the "neck" of PCMAG
 - 1 glued to the outside of PCMAG

Together with the measurement of the current in the magnet they will form a redundant check of the magnet strength at all times (nominal ~ 1 Tesla)



Operation of PCMAG for the calibration



Thanks to the help of Osamu Araoka, Takeshi Matsuda and the DESY team

The cooling of the magnet took ~5 days (?)

Some improvements to the magnet infrastructure have been proposed as a result of experience gained during the mapping campaign



Data collection



- The result of the EUDET mapping can be found on AFS:
 - `/afs/cern.ch/user/f/fxb/public/eudet`
 - The directory eudetr contains the raw data, eudetc contains the converted data. The format of the latter is:
 - `sensor#, Bx,By,Bz[Tesla],temp[deg C]`.
 - Measurements were made every 5 degrees in PHI and every 14 mm in Z.
 - From run eu28 on sensor 4 has been put in position properly.
 - Files beginning with "offset" contain measurements with field off.
 - Files beginning with "eudet" contain measurements with fixed probes.
 - The NMR recordings on magnet axes were:

pos [cm]	B [Tesla]
-10	0.97852
-5	0.98079
0	0.98160
+5	0.98096
+10	0.97838
 - 0 = max field, positiv direction is towards big opening.



Data analysis



- Work will be carried out by Christian Grefe from DESY, who has started working on the data.
- Christian will come to CERN for a few months (as of September '07) to carry out the task.



Conclusions



- Thanks to the EUDET project improved 3D Hall sensors could be developed and constructed
- The field mapping of PCMAG was successfully accomplished the end of July 2007
- Our aim is to finish the data analysis for the end of 2007.