

Beamline and Magnet

Documentation:

HPS Beamline Commission Document v1 October 20, 2014 [HPS beamline commissioning document v1.0.docx](#)

Beamline Alignment with magnets at 95in. separation: [beamline_Mar032014.pptx](#)

[Beam trajectory through pair spectrometer magnet](#) , from simulation.

Engineering drawings of beamline and components: <https://userweb.jlab.org/~zarecky/Dark%20Matter%20file%20directory.htm>

7/26/2011 slides from Stepan including plan and survey positions of vacuum chamber: [BeamLine_updates.pptx](#)

Beamline photos are available: [Beamline.pptx](#)

See [Calorimeter](#) for ECal-specific docs.

Presentation of Beamline update at Wednesday morning, 27 March 2013, meeting [Beamline 27 March 2013.ppt](#)

ECal vacuum flange: [beam gap vacuum chamber](#), [honeycomb](#)

Fieldmaps:

The magnetic field maps used for simulation and reconstruction are derived from TOSCA simulations combined with PRIMEX measurements of the fringe fields. That procedure is described [here](#). This results in the following files:

[BmapCorrected3D_3k.txt](#)

[BmapCorrected3D_4k.txt](#)

[BmapCorrected3D_5k.txt](#)

[BmapCorrected3D_6k.txt](#)

[BmapCorrected3D_7k.txt](#)

[BmapCorrected3D_8k.txt](#)

[BmapCorrected3D_9k.txt](#)

[BmapCorrected3D_10k.txt](#)

[BmapCorrected3D_11k.txt](#)

[BmapCorrected3D_12k.txt](#)

[BmapCorrected3D_13k.txt](#)

These maps represent one eighth of the field volume, assuming symmetry for the other seven octants.

The file format is:

X Y Z BX BY BZ

with units of cm and Oersteds.

These files are then converted into a format appropriate for the slic simulation program and the hps-java reconstruction code using the following prescription:

First, determine the field setting required for the energy of the beam.

Find the closest fieldmap calculation in the above list and determine the scaling factor to bring the central value of the fieldmap into accord with the desired setting.

Scale, unfold and convert units of the txt file into a file which can be used by slic and hps-java using the following command:

```
java -cp ~/.m2/repository/org/hps/hps-distribution/3.11-SNAPSHOT/hps-distribution-3.11-SNAPSHOT-bin.jar org.hps.util.UnfoldFieldmap < fieldmap > < scaling factor >
```

The resulting file, out.dat, should be renamed to preserve the provenance, e.g.

125acm2_3kg_corrected_unfolded_scaled_0.7992.dat (1.056 GeV running)

209acm2_5kg_corrected_unfolded_scaled_1.04545.dat (2.3 GeV running)

The fieldmaps are archived at <http://www.lcsim.org/resources/hps/fieldmap/>

For HPS fieldmaps are on GitHub: <https://github.com/JeffersonLab/hps-fieldmaps.git>

Chicane Current Settings:

Document:

Chicane current setting M. Ehrhart, G. Kalicy, S. Stepanyan February 1, 2016: https://wiki.jlab.org/hps-run/images/c/c6/Chicane_settings.pdf

HPS chicane current setting M. Ehrhart, G. Kalicy, Holly Szumila-Vance, and S. Stepanyan, August 3, 2015: https://misportal.jlab.org/mis/physics/hps_notes/viewFile.cfm/2015-007.pdf?documentId=10

For 2019 run

Beam energy reported by MCC: 4.556651 GeV

Beam energy to field setting conversion from above documents: $B = E_b * 0.22727 \text{ Tesla/GeV} = 1.03559 \text{ T} = 10355.9 \text{ Gauss}$.

Analyzing magnet current: was set to 1592.37 A, the current readback was $1609.576 \pm 0.058 \text{ A}$, Magnetic Field read back: $-9668.1 \pm 21.3 \text{ G}$

Calculated field from current: $(1592.37 - 0.6657)/0.1537 = 10355.9 \text{ Gauss}$.

The field map used for 2019 is 418acm2_10kg_corrected_unfolded_scaled_1.0319, so uses 10319 Gauss field (0.36% low).

(Method for average field and current read back: take the MYA current and field probe read back for the Analyzing Magnet (PSPECIRBCK, HPS: LS450_2:FIELD) for the period 2019-07-26 19:08 until 2019-09-08 21:26. For each run, search for a value before the run_start time. Compute average and std for those values that are > 1599 (current) or < -9000 (field).)

Papers:

Talks:

Subtopics: