

Global Track Analysis and Magnetic Field Mapping

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Looking at downstream residuals between tracks extrapolated through TkD to TOF2 and spacepoints in TOF2.

If MC and data do not agree then it could be due to a discrepancy in the solenoid alignment.

Also we would like to look at the residuals between US/DS tracks extrapolated to the centre of the absorber.

This involves tweaking the Track Matching code to enable TkD tracks to be extrapolated US to the absorber (and possibly beyond).

Globals Analysis

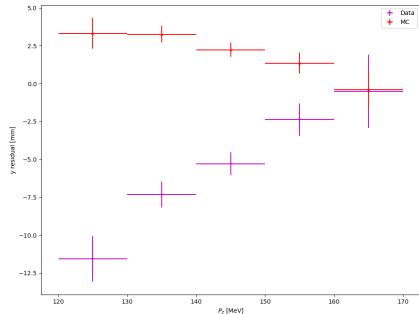
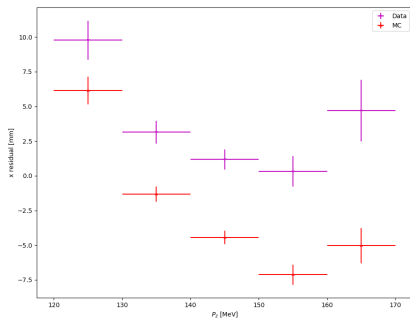


Figure: TOF2 residuals for run 10052 MC and Data

Residuals show dependence on longitudinal momentum – dipole effect?

Productive talk with Chris R yesterday. Plan is to investigate with my own simulations with different SSD alignments.

Also plan to expand work that Chris H did on fitting straight lines to helical tracks!

Field Mapping Code Update – Python can only get you so far

A few upgrades to the field mapping code have been implemented:

- Code that makes field maps has been implemented in C++ for fast and efficient calculation.
- Enabled a 'coil fit'
- Using `__slots__` for classes that hold field map data
- With the above in mind, the code to generate full field maps (g4blgrid format) can now be calculated

Essentially, the code no longer eats all of your RAM and also a full field map can be generated within a reasonable time frame (~1–2 hours rather than)

Getting the code

Clone/download the code from github

<https://github.com/JoeLanglands/MICE-MagneticFieldMapping>

Updated code WILL be available from the end of next week at the latest. I just need to tie a small number of loose ends.

The code requirements are:

- numpy
- scipy
- iminiut
- matplotlib
- Boost C++ libraries (especially Boost python)

First four are available readily from pip. Last one should be pretty common and easy to get using your favourite package manager.

Future work on Field Mapping Code

- Re-run fits with sensible limits for minuit
- Add survey data code and supporting code
- General code clean up
- Easy plotting routines
- Make a GUI (spare time GUI practice)