HFOFO Project Updates

Week of October 18–24, 2025

https://github.com/criggall/muon-cooling/tree/main

Objectives for this week

- ☑ Fix fit to dipole term in residual field
- ☐ Re-run simulations with improved fit + regenerate field map plots
- ☐ Investigate various approaches to incorporating field rotation (placing discrete regions per Katsuya's suggestion, using a sigmoid fit, etc.)
- ☑ Write a few paragraphs for the Initial Cooling section of the ESPPU report
- ☑ Prepare talk for COOL'25
- ☐ Make some plots to understand relationship between dispersion and dipole field in the lattice
- ☐ Investigate momentum stop band

Improving the fit

$$B(z) = 0.055\sin(0.009z + 1.570) + 0.008\sin(0.018z + 1.573) + 0.002\sin(0.027z - 1.579) + 0.002\sin(0.040z - 1.603) + 0.0608$$

Including 4 sine terms in the expansion + starting with FFT guess significantly improved the fit!

Magnitude of dipole term in residual field