Progress with magnetic field maps for G4BL

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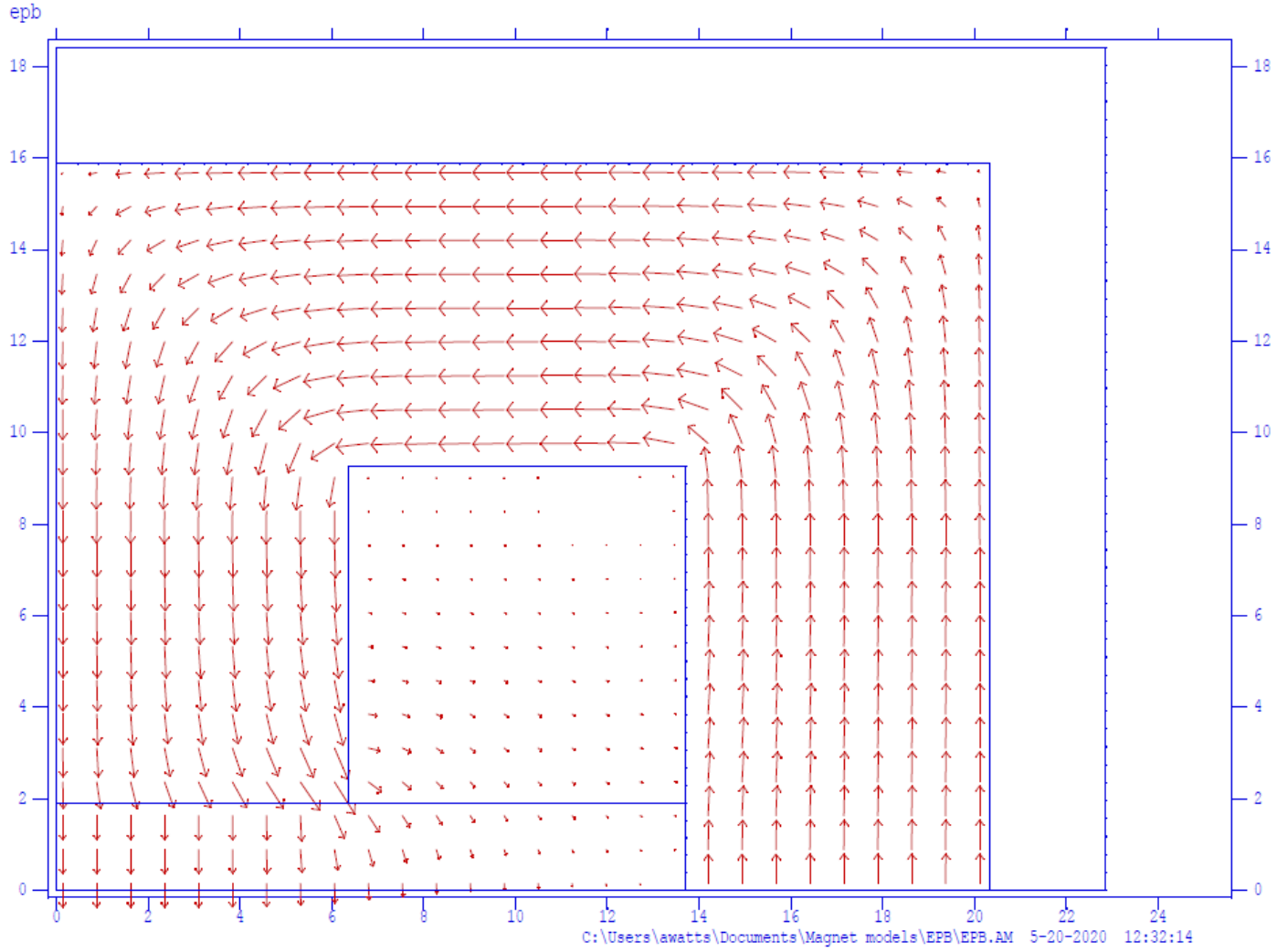
Magnet yoke field modeling

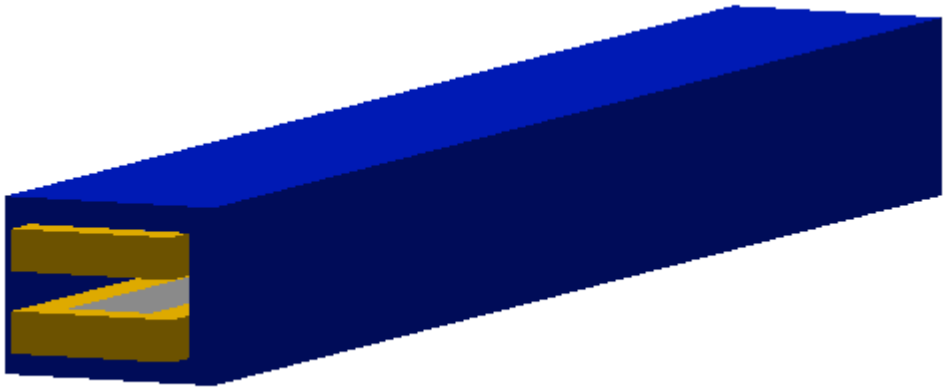
- Major magnets all implemented in G4Beamline with fieldmaps from Poisson:
  - EPB dipole (MC6D main bends)
  - 3Q120/QQM quadrupole (MC6Q1,3,4,6)
  - 4Q120/RQB quadrupole (MC6Q2,4)
- Particle tracking behavior verified for individual magnets as compared to their genericbend/genericquad counterparts

Poisson model: EPB dipole



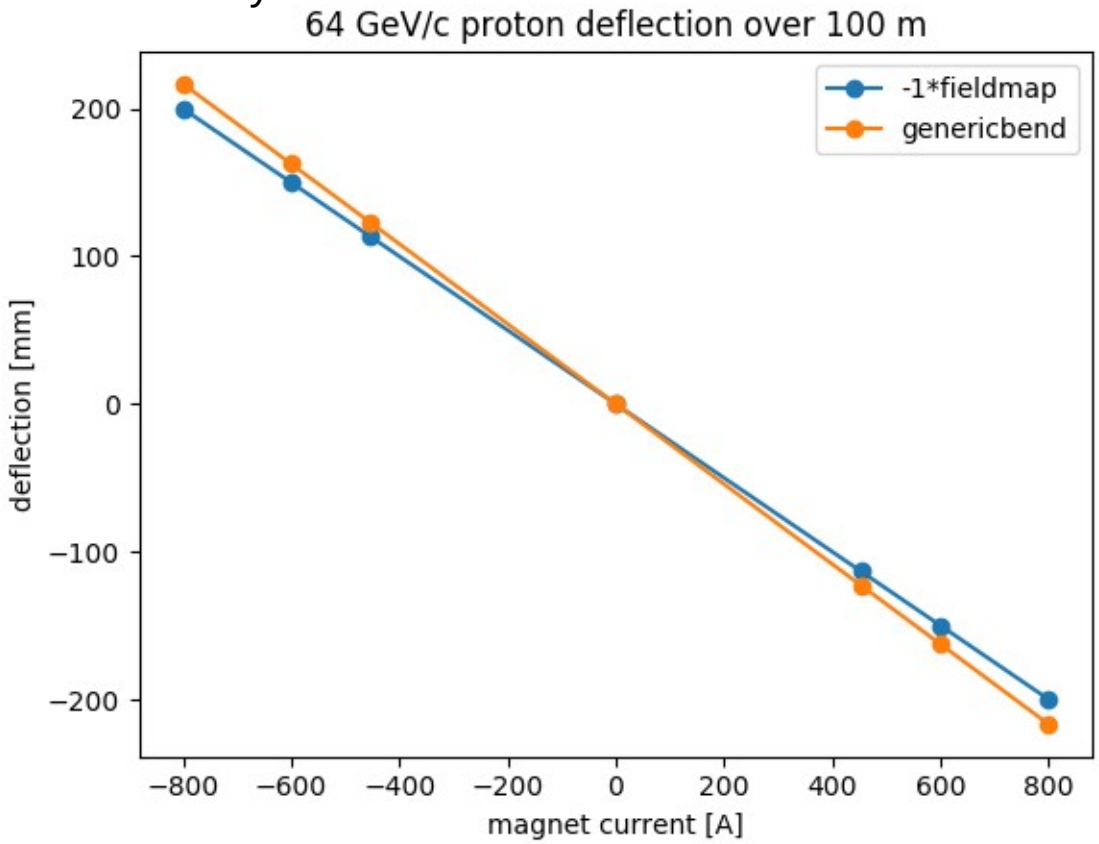
New G4BL implementation of EPB dipole

Group shape built from steel and copper boxes as per dimensions on engineering drawings for the EPB dipoles.

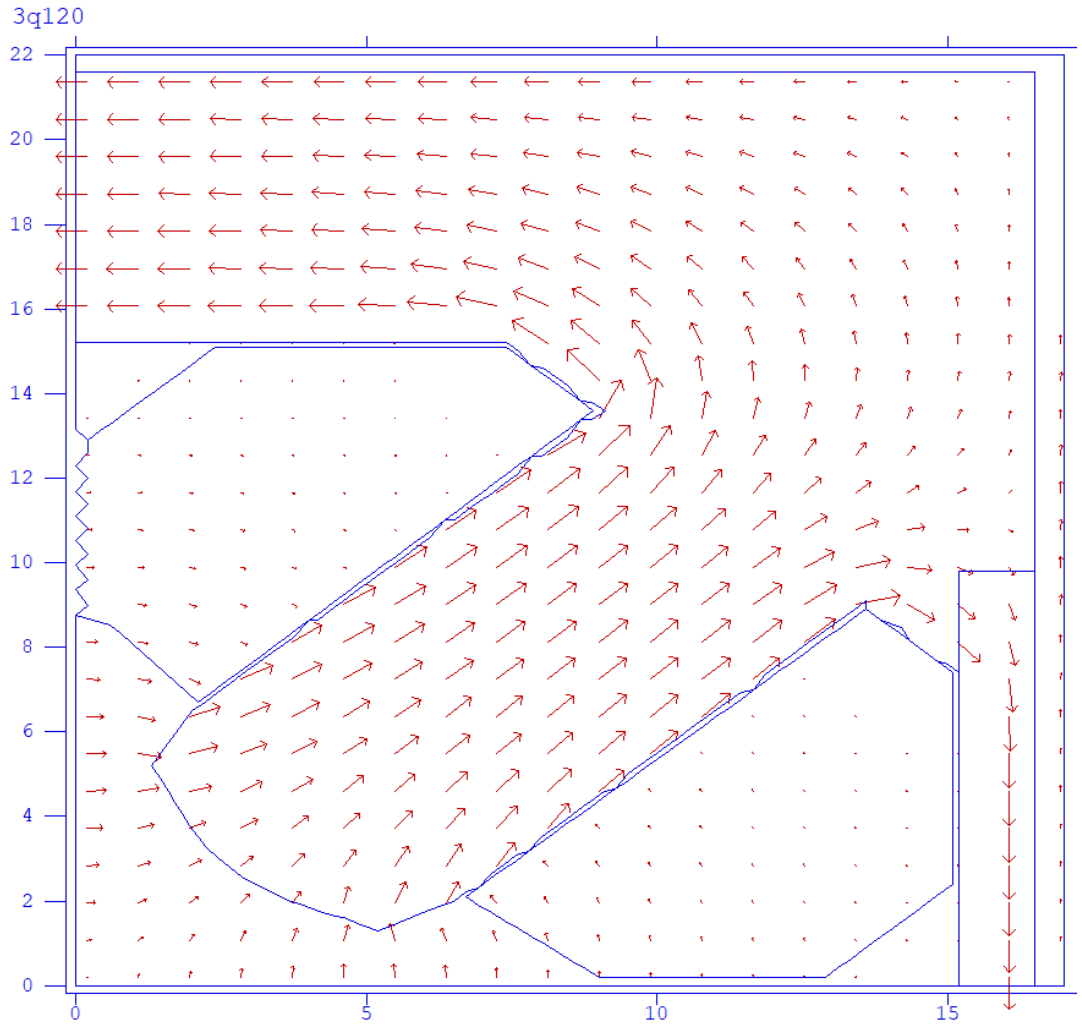


EPB w/ fieldmap vs. genericbend

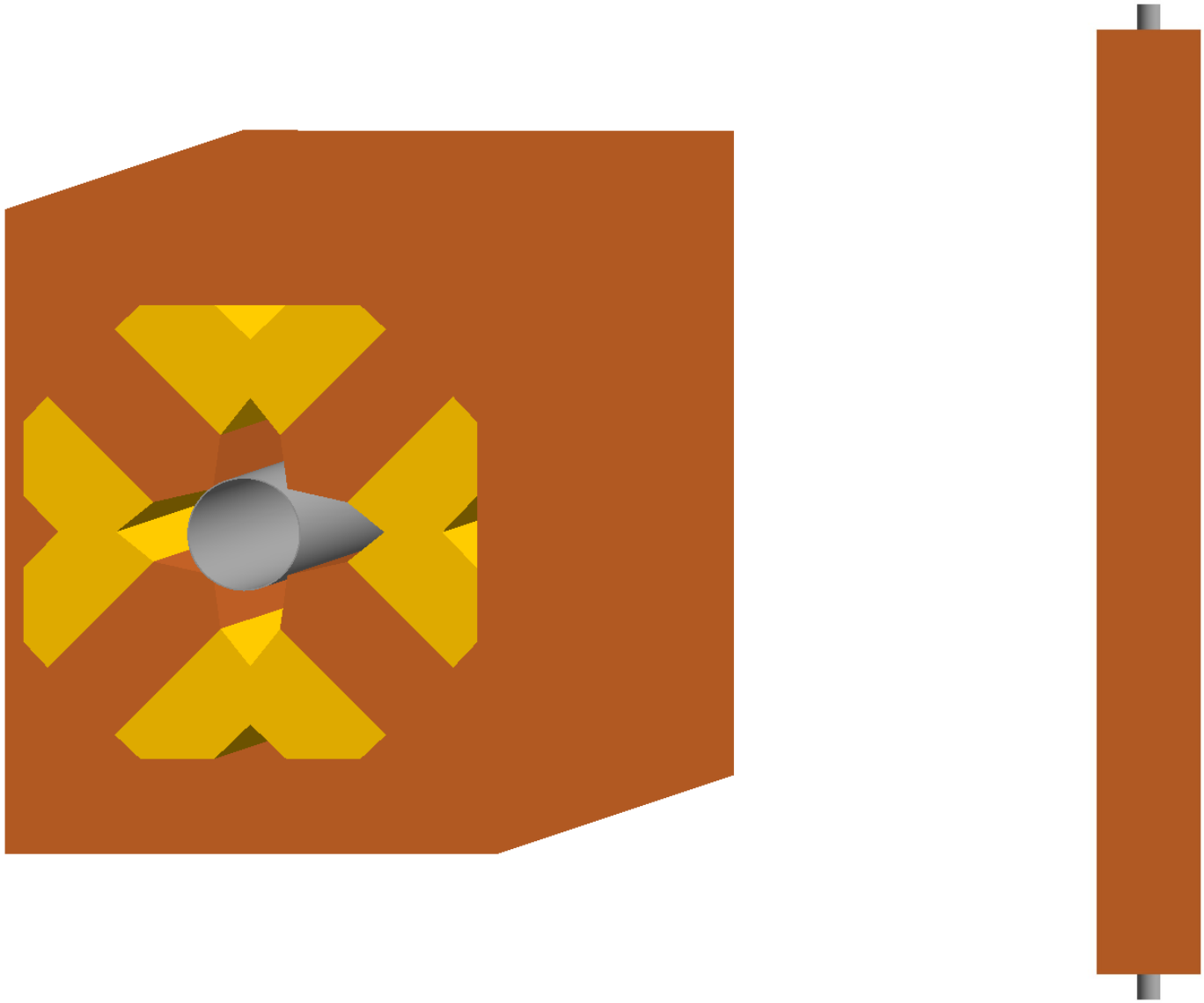
On-axis proton deflected by fieldmap-EPB and genericbend-EPB, measured at virtualdetector 100m away.



Poisson model: 3Q120 quadrupole

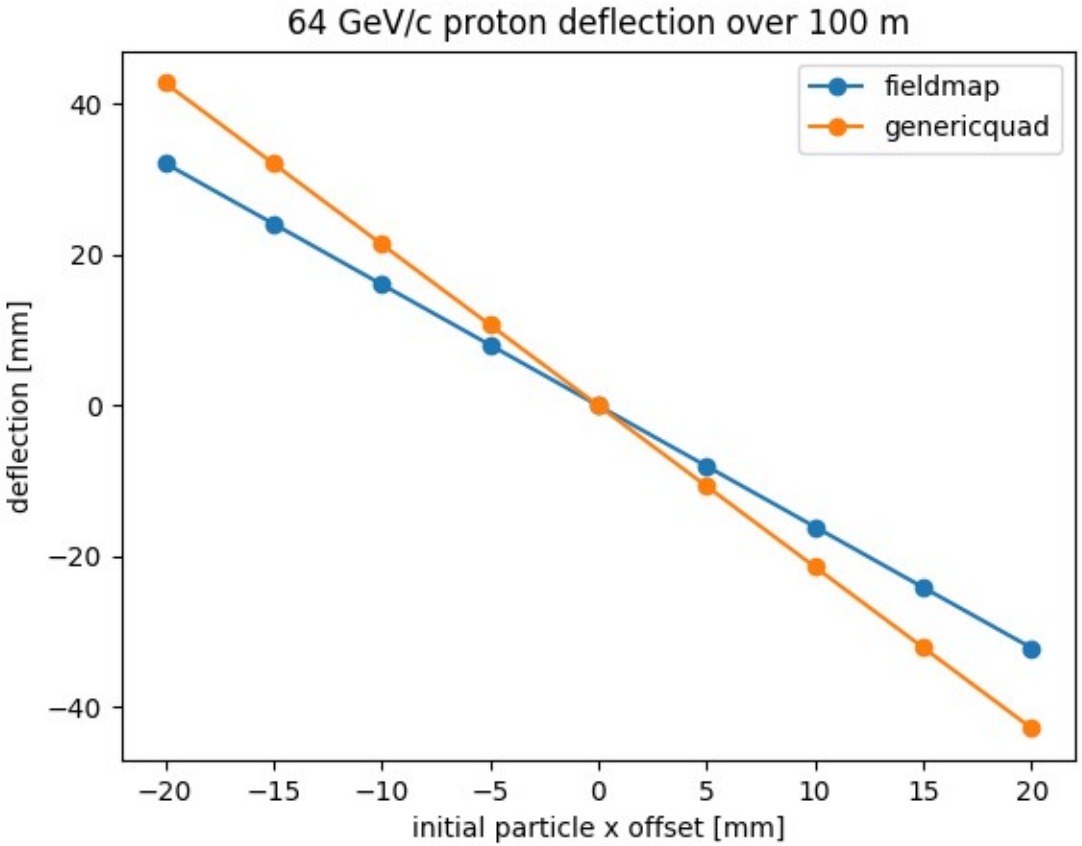


New G4BL implementation of 3Q120 quadrupole

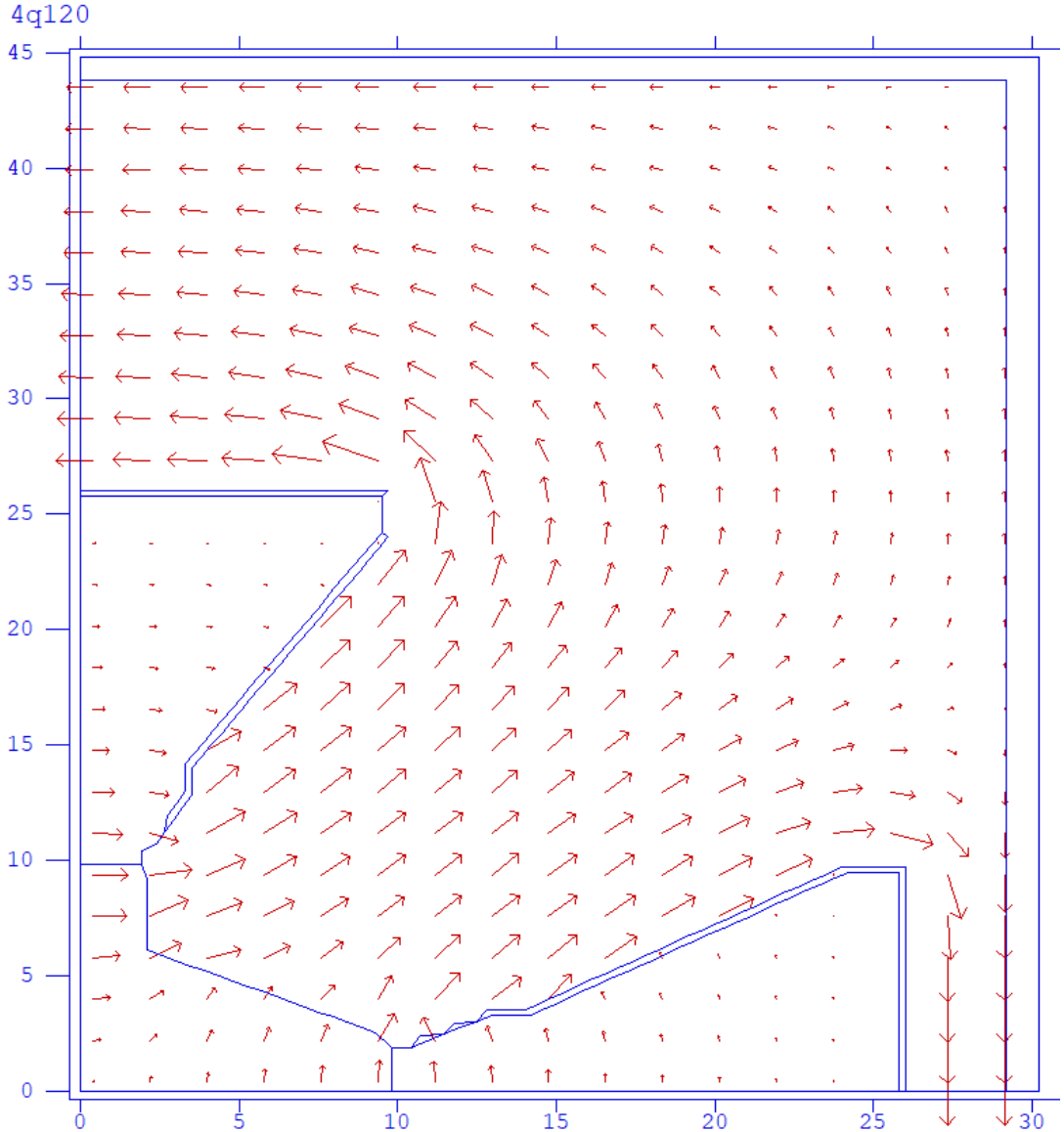


3Q120 w/ fieldmap vs. genericquad

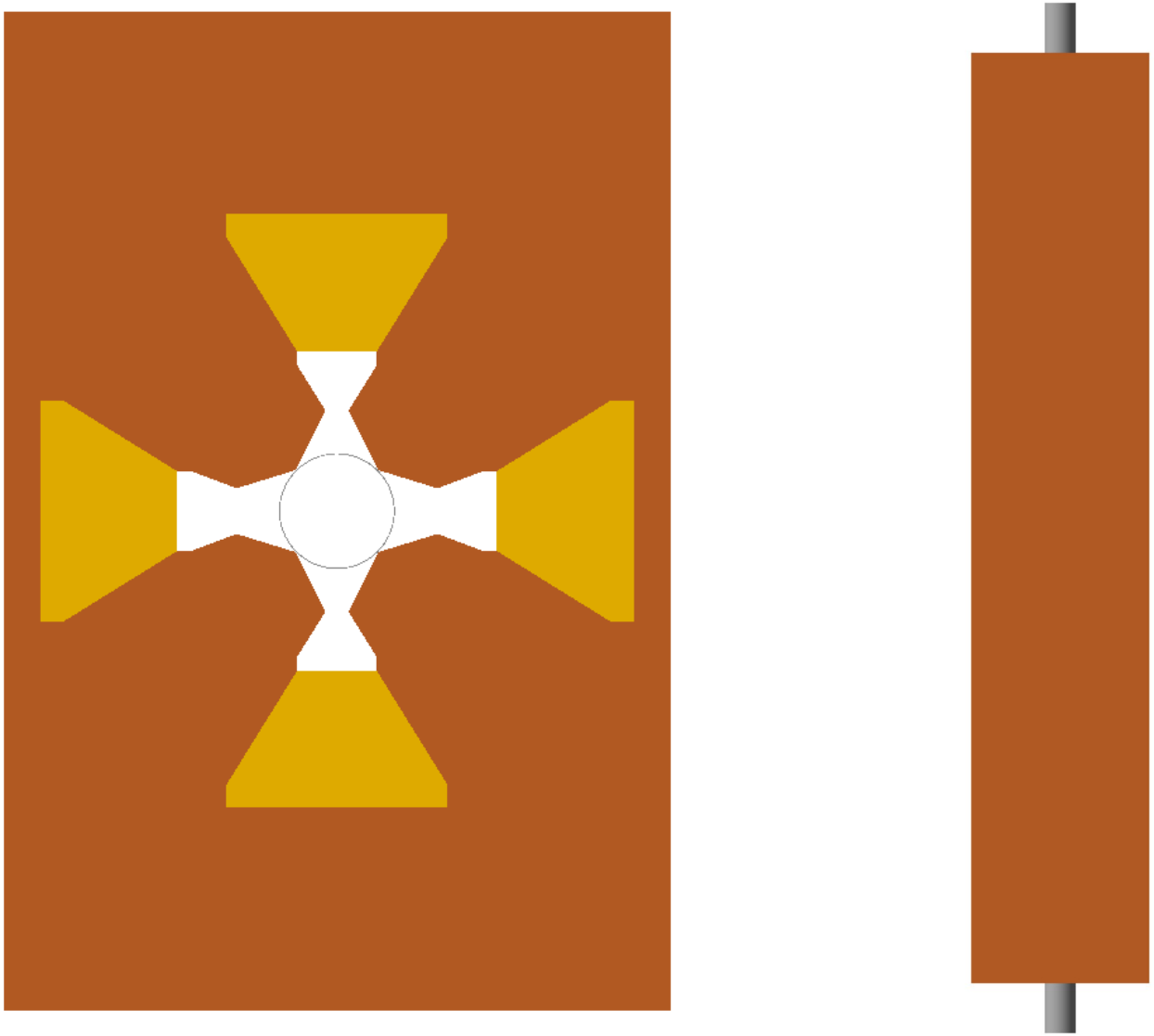
At 60A, initial parallel rays with different transverse offsets tracked through quad to virtual detector 100 ft. away.



Poisson model: 4Q120 quadrupole

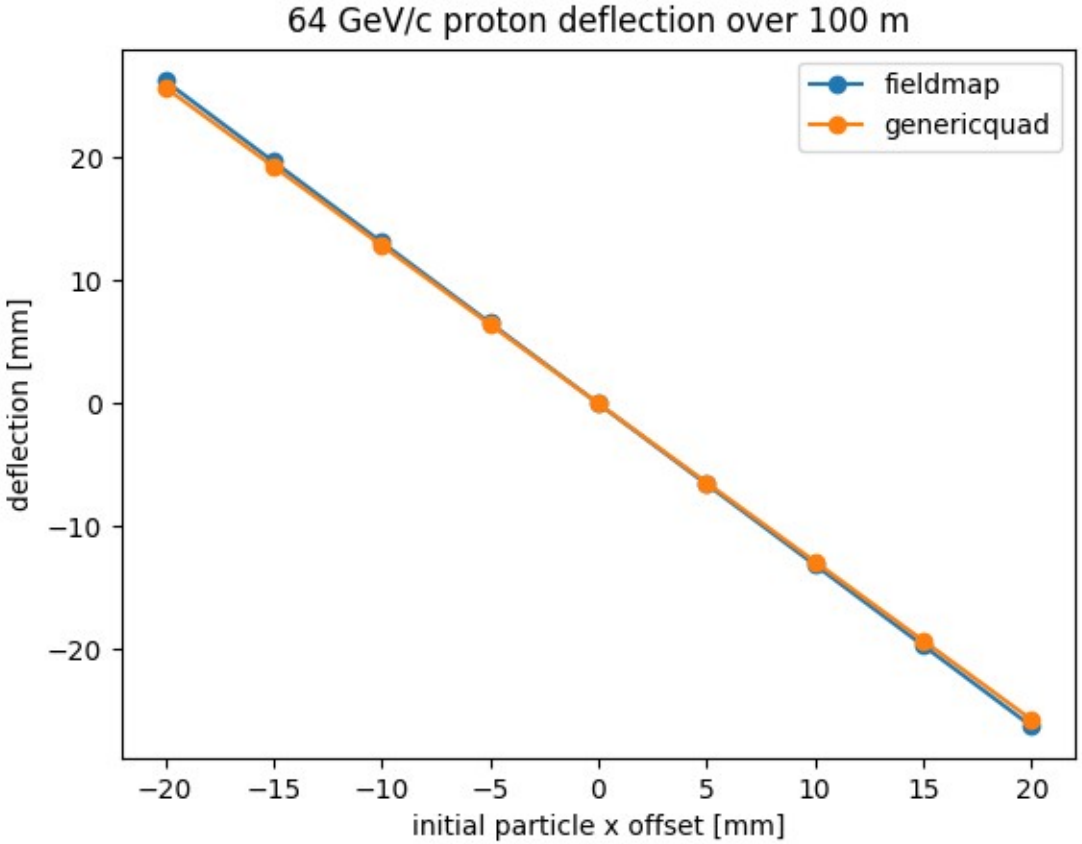


New G4BL implementation of 4Q120 quadrupole



3Q120 w/ fieldmap vs. genericquad

At 430A, initial parallel rays with different transverse offsets tracked through quad to virtual detector 100 ft. away.



Summary

- Reasonable agreement between new fieldmap definitions for main magnets and their generic counterparts
- Field maps now take measured steel B-H curves into account (Poisson)
- Still need to check field in yoke with particle tracks
- Still need to place new definitions in overall G4BL model and check principle ray tracing, compare to generic magnets