FIELDMAP ISSUES

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(MAGNETIC FIELD MOUSE)

MOUSE-HOLE!

LONGSTANDING PROBLEM WITH THE FIELDMAPS

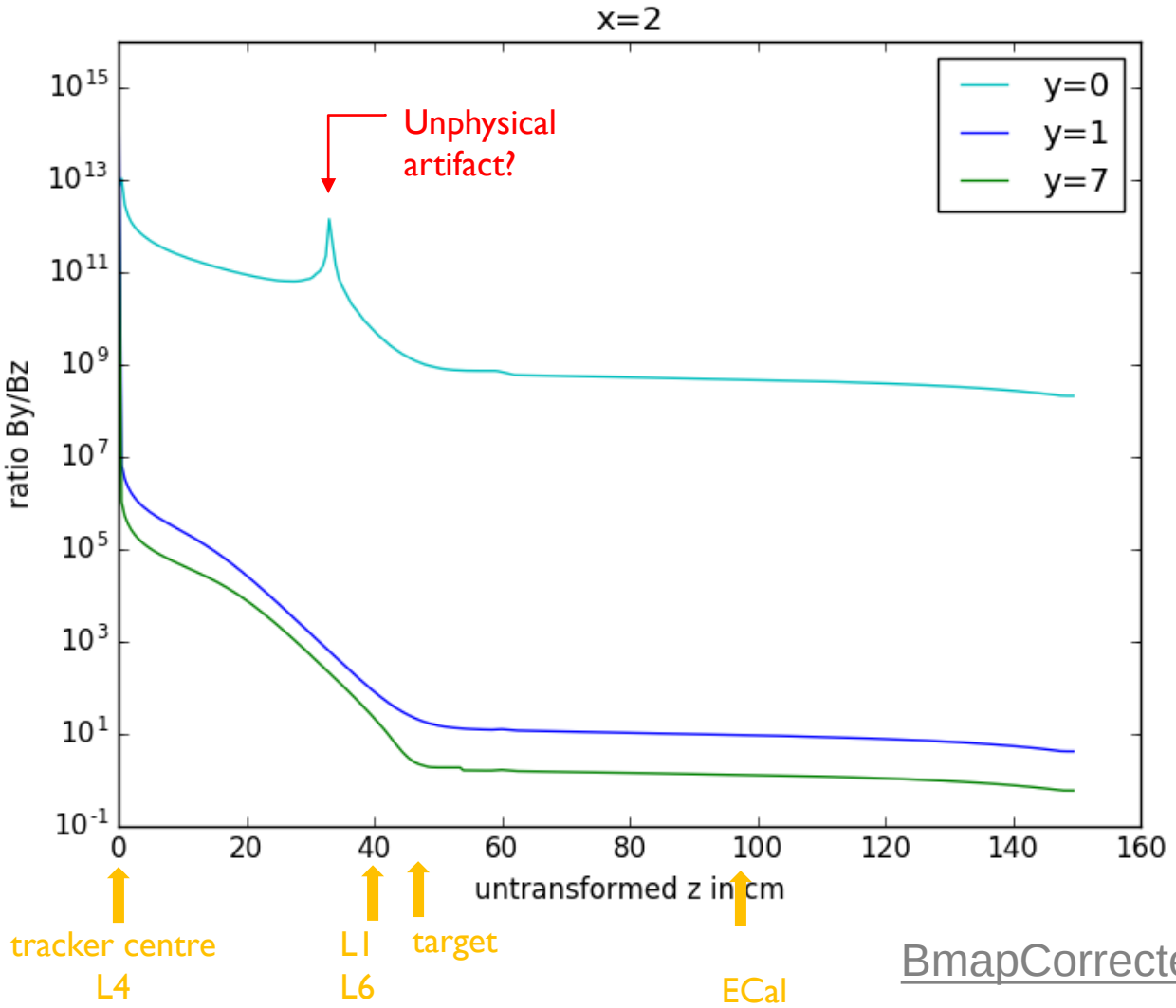
- *_corrected_unfolded_scaled_*.dat fieldmap files used for **MC production and for recon**
- Due to bug in fieldmap file production: field values **do not depend on y** (global coordinate system) position. They depend on x and z, but **use y = 7 cm** (at top fringe!)

- .txt files with values from TOSCA simulations + PRIMEX fringe measurements: correct
  https://confluence.slac.stanford.edu/display/hpsg/Beamline+and+Magnet
- Production of .dat files from these .txt files: buggy
  https://github.com/JeffersonLab/hps-java/blob/master/util/src/main/java/org/hps/util/UnfoldFieldmap.java

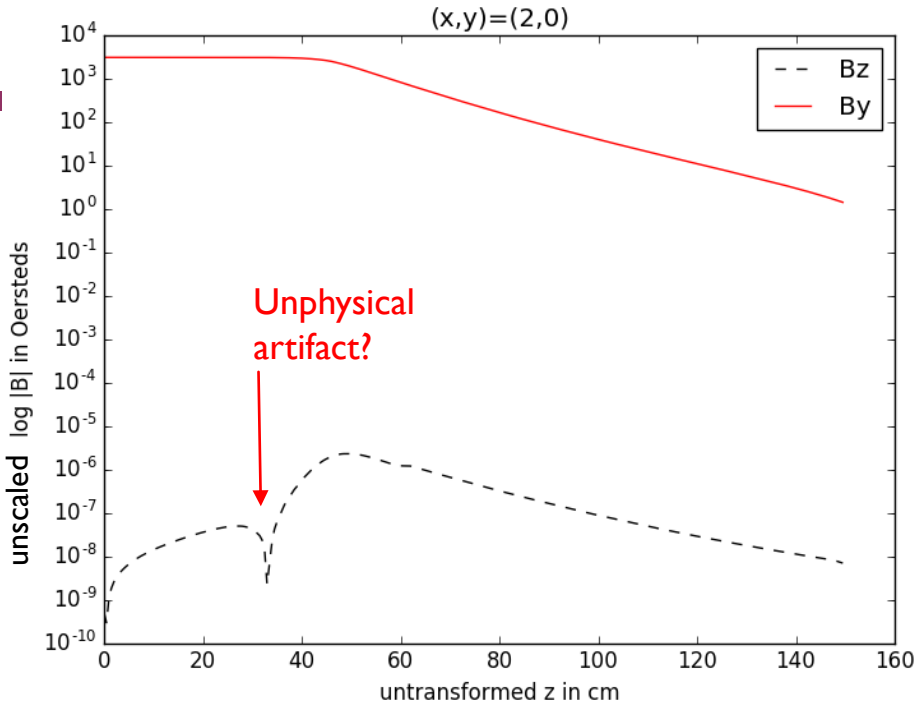
- What does .txt to .dat do?
  - Unit conversions, scaling of field magnitude, coordinate translations
  - Unfolds octant into entire plane (symmetric about each axis)
  - Does not affect ratios of magnetic field components

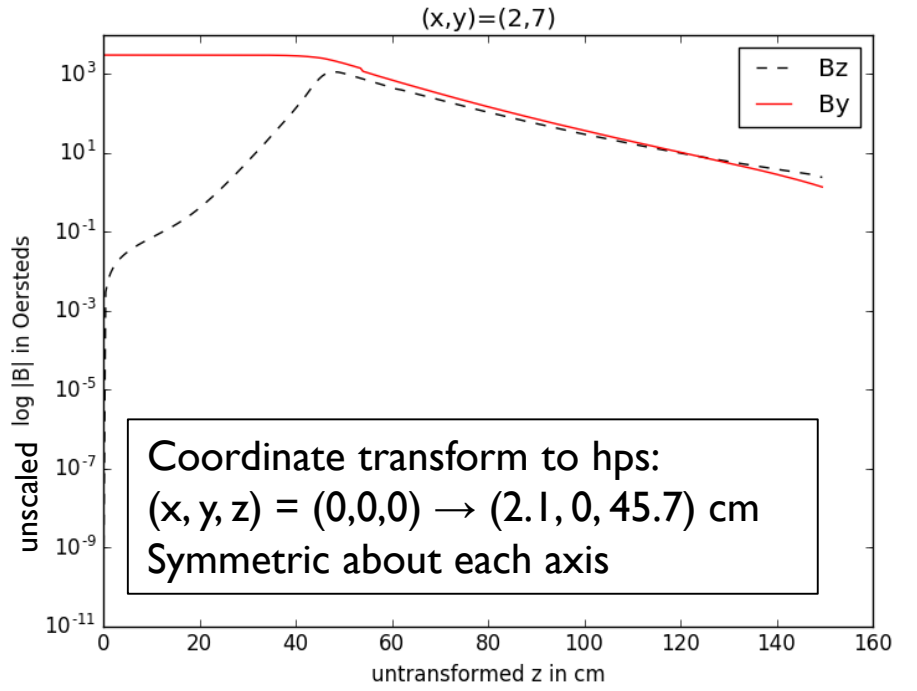
TXT FILE STUDIES: B_Z / B_Y RATIO

- At small y values, Bz is orders of magnitude smaller than By (as expected)
- At y = 7 cm, Bz attains same order of magnitude!
  - e.g. appears as 19° tilt of field at target (Robert's observation)



BmapCorrected3D_3k.txt



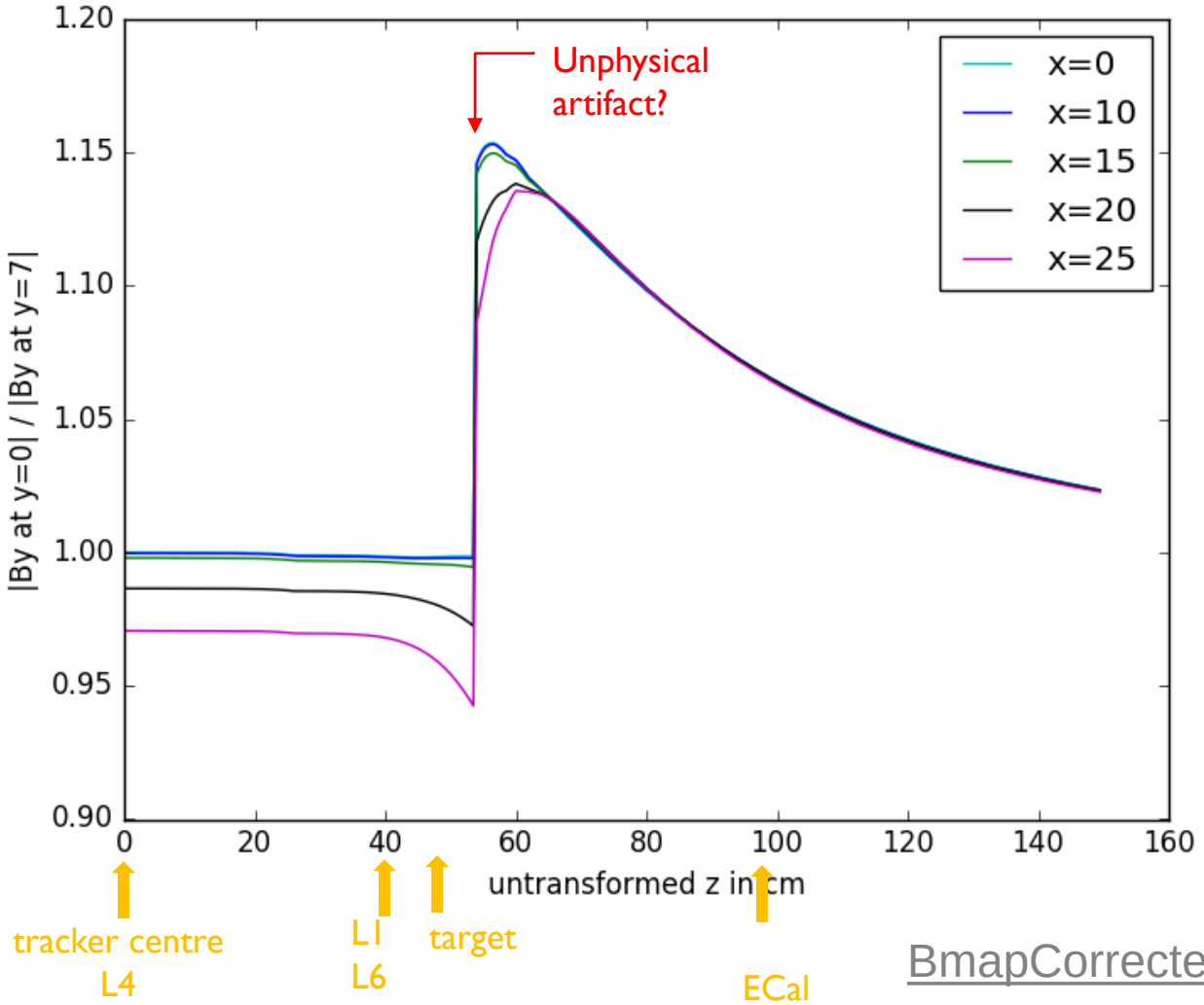


TXT FILE STUDIES: B_Y

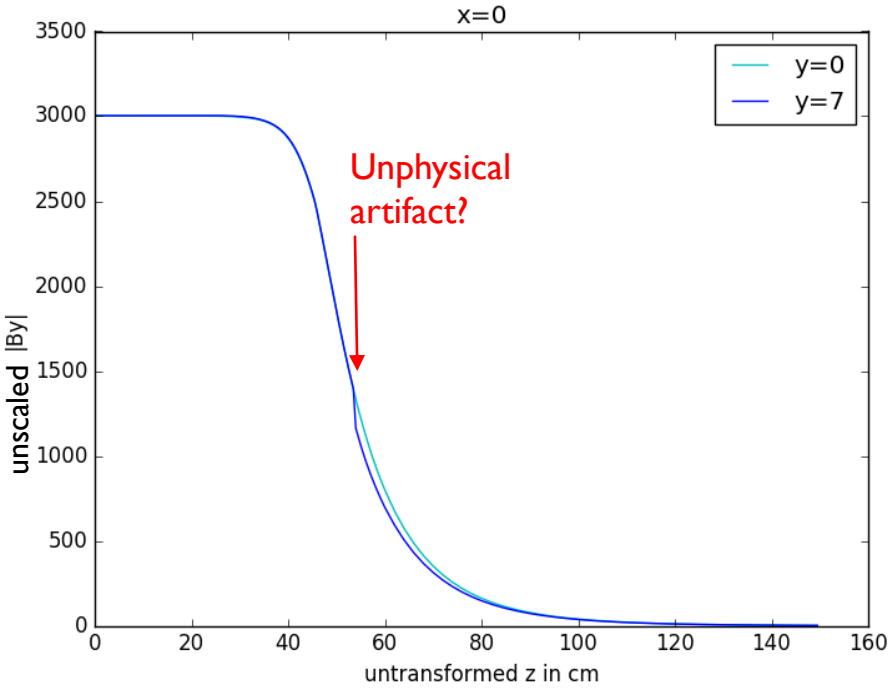
- In reco, often just By is used. How much does the bug affect By?

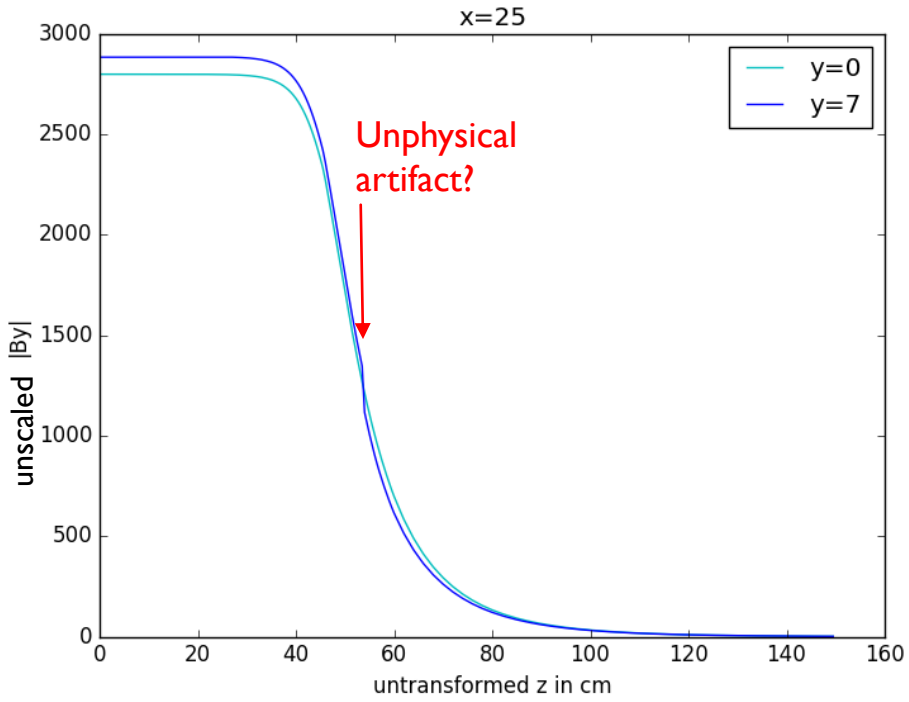
$\frac{|By \text{ at } y = 0|}{|By \text{ at } y = 7|}$ is indicative

Coordinate transform to hps:
(x, y, z) = (0,0,0) → (2.1, 0, 45.7) cm
Symmetric about each axis



BmapCorrected3D_3k.txt





ACTION PLAN

- Fix bug, re-create .dat files from the .txt files
  - Github issue for bug-fix: https://github.com/JeffersonLab/hps-java/issues/321
  - Bug-fix pushed to iss321 but still untested
  - Instructions for running txt-to-dat: https://confluence.slac.stanford.edu/display/hpsg/Beamline+and+Magnet

- Page for keeping track of fieldmap effects: https://confluence.slac.stanford.edu/display/hpsg/Fieldmap+Mouse-Hole
  - List all places in recon that access full fieldmap, find which recon studies are affected
  - Decide how much / which MC needs to be regenerated
  - Assess which analysis quantities may be affected