Cooling Channel Optimisation

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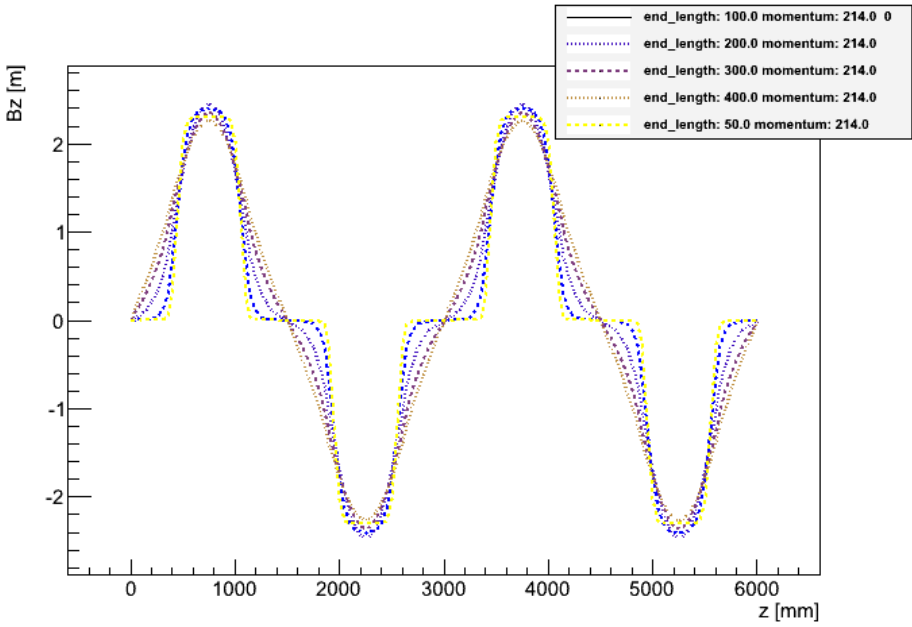
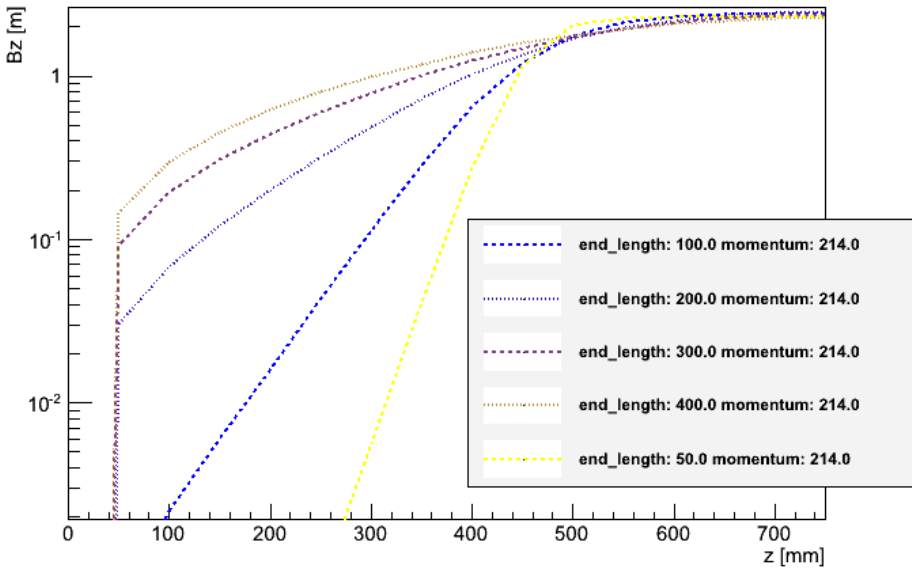
Tanh model

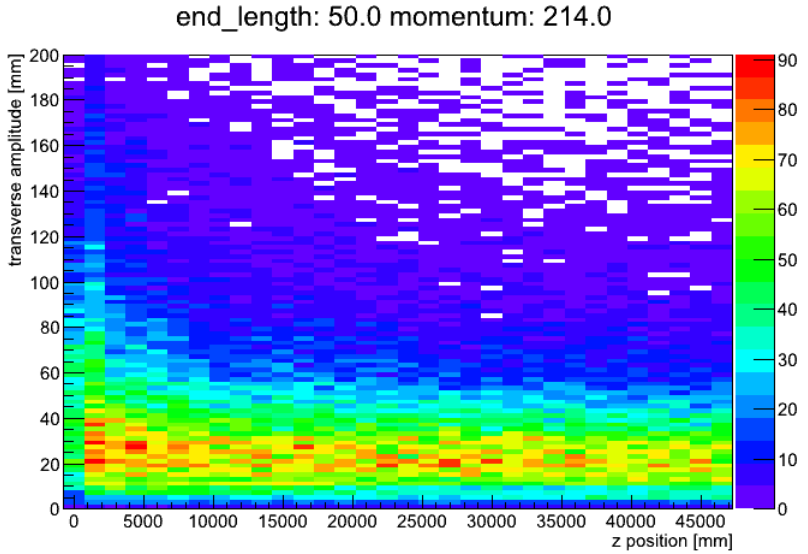
- Exploring cooling using tanh model
  - Idea is to determine what field envelope is required to give best cooling performance
  - Then try to design a magnet that fits
- For this study
  - Consider 1.5 m between coils
  - Singlet lattice
  - Fields off axis calculated by polynomial expansion to 6th order
  - Choose fields to get beta=800 mm at 214 MeV/c (IIRC this is FS2A optics)
- Here – how does this affect transmission

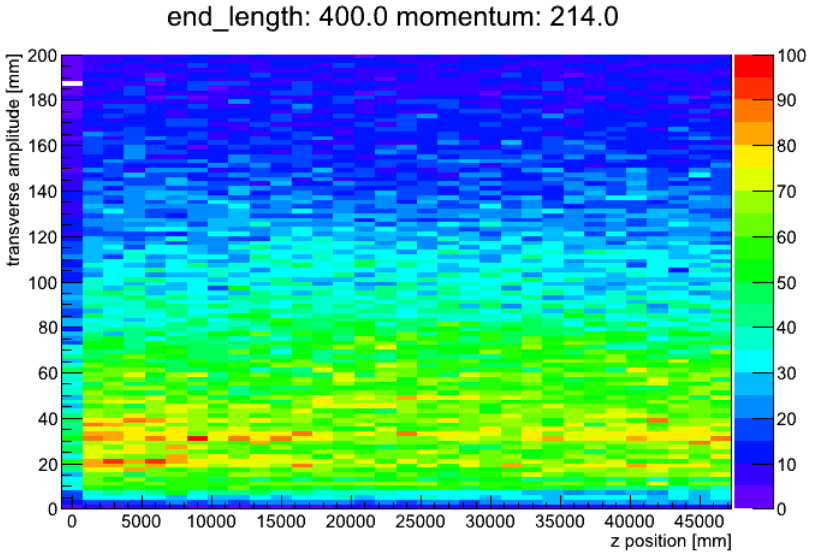




Beam evolution – 214 MeV/c

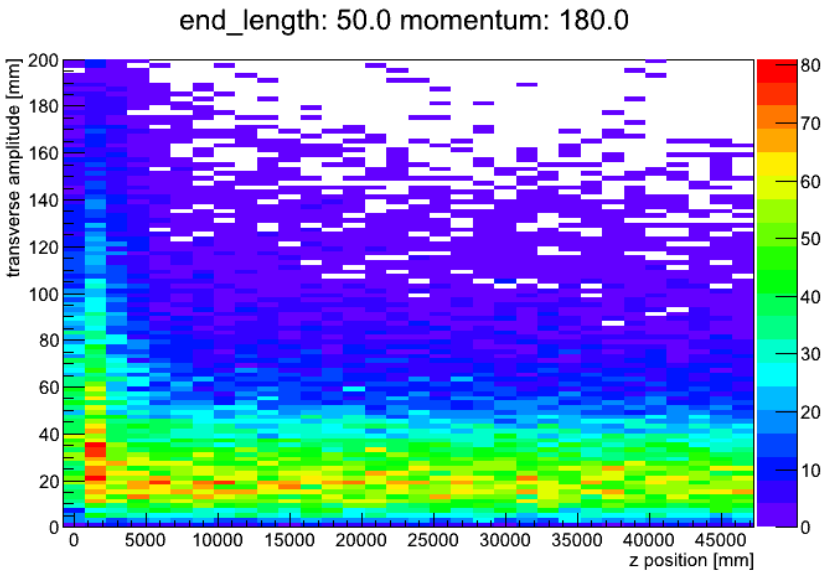
- Does this affect dynamic aperture?
  - Yes!
  - Plot amplitude evolution for the same beams
  - Consider 50 mm end field length
  - Consider 400 mm end field length
  - At 214 MeV/c

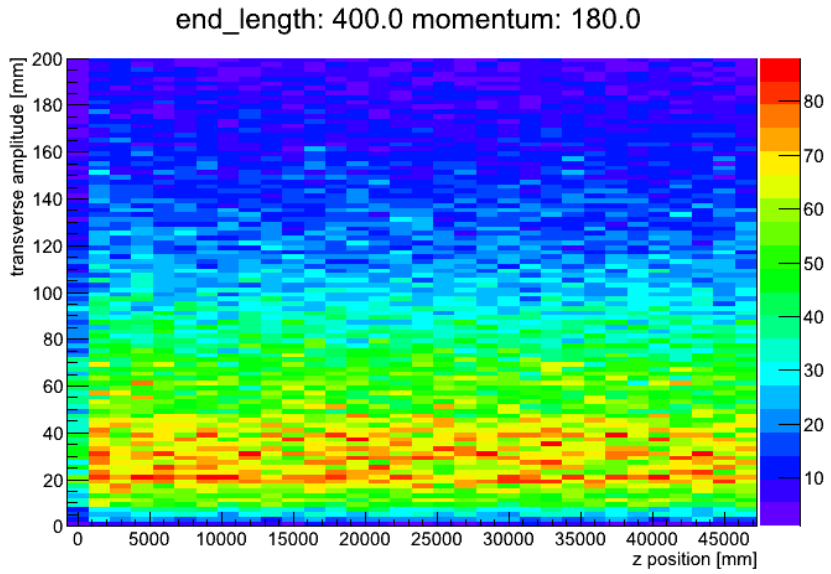




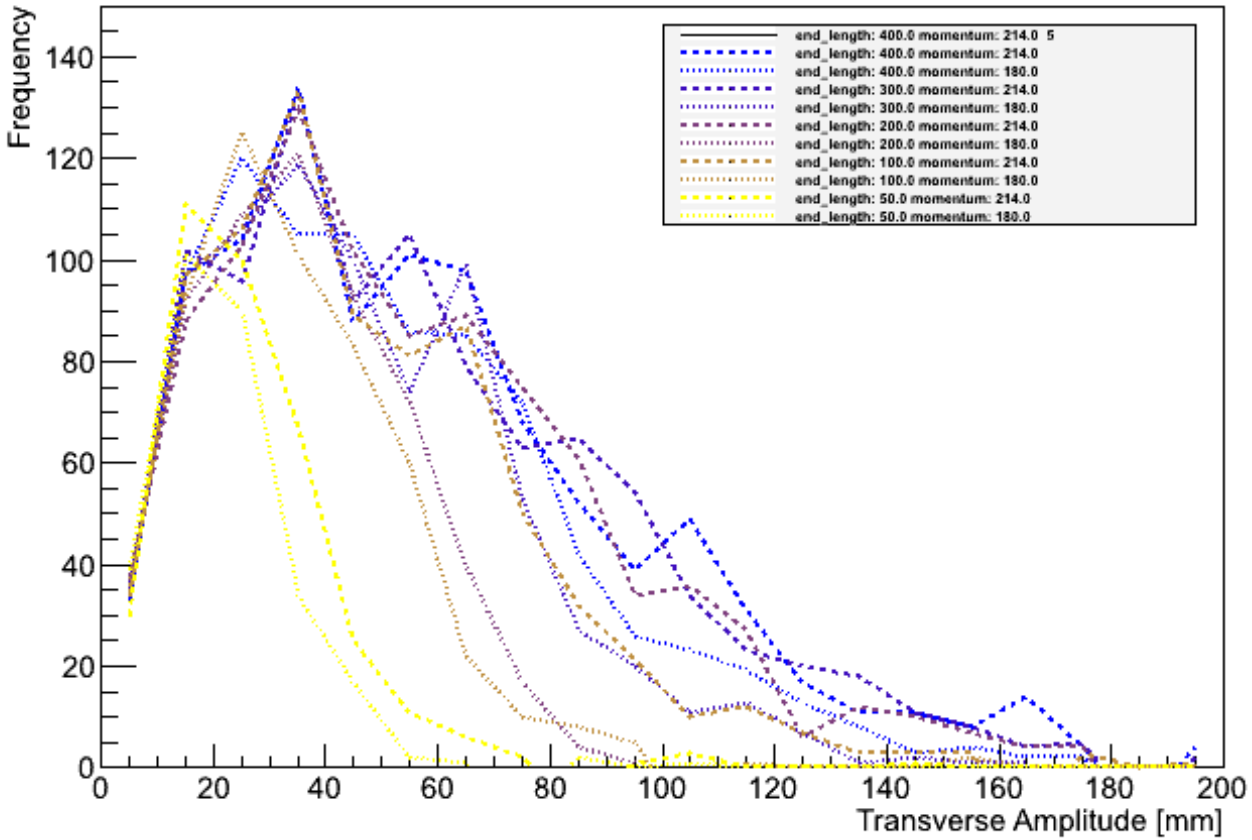
Beam evolution – 180 MeV/c

- The situation is a bit worse at 180 MeV/c



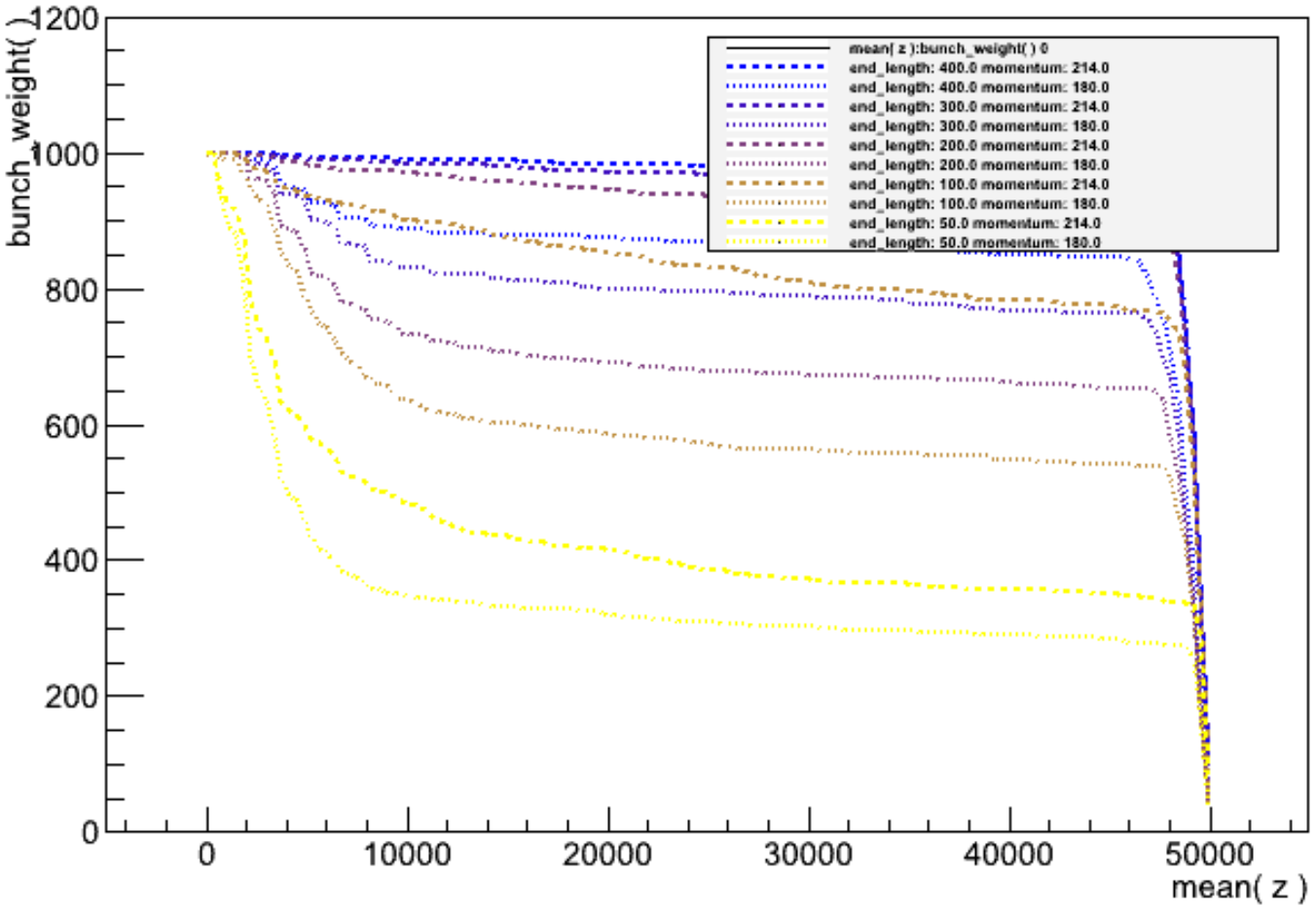


Amplitude at end of beamline



- Can see cut off gets sharper for shorter end field

Transmission



- This is also reflected in transmission

Transmission

- So yes, sharper fringe field cut off does have a serious affect on tranmission
- Shielding doesn't necessarily help
- Can improve things by choosing difference fringe field function?