Alternative Lattice Designs and Absorber Positions

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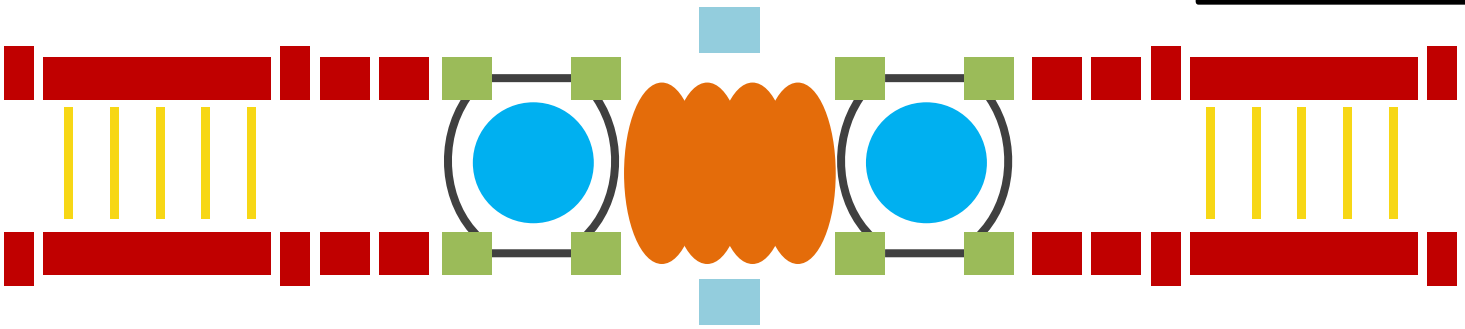
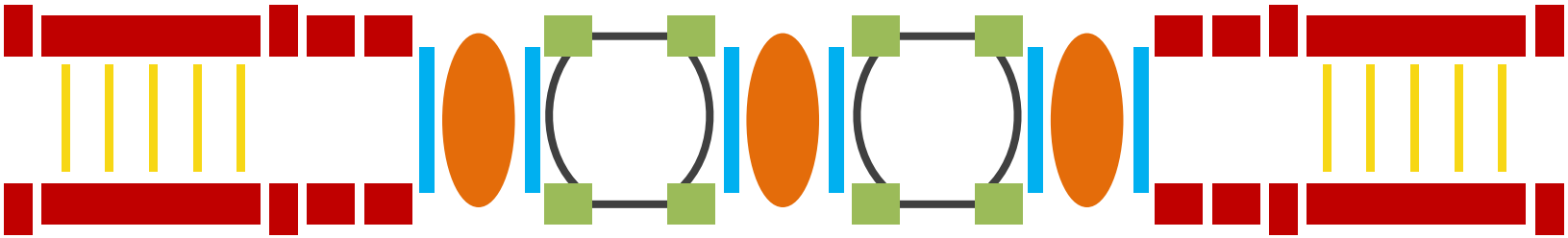
= absorbers

Step V:



Step Pasternak-Pi:



Good

- Gap between SS and FC enables easier matching into channel
- Could restore pz with three cavities
- Shields trackers from RF
- Keeping “gaps” to 1 RF-width eases matching

Not-so Good

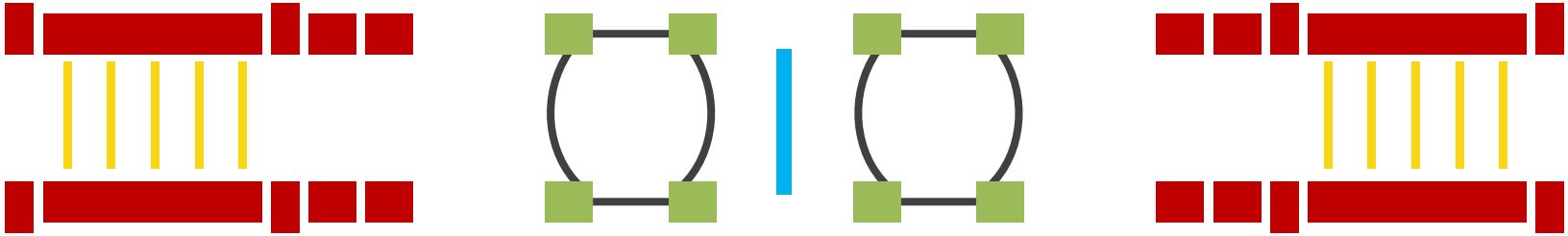
- Difficulty in acquiring absorbers
- Large(ish) beta at Focus Coils
- Awkward lattice cell (~ 2+1/3 lattice parts)
- Absorbers not at minimum beta

Shares similarities with C. Roger’s lattice, so worth investigating further…

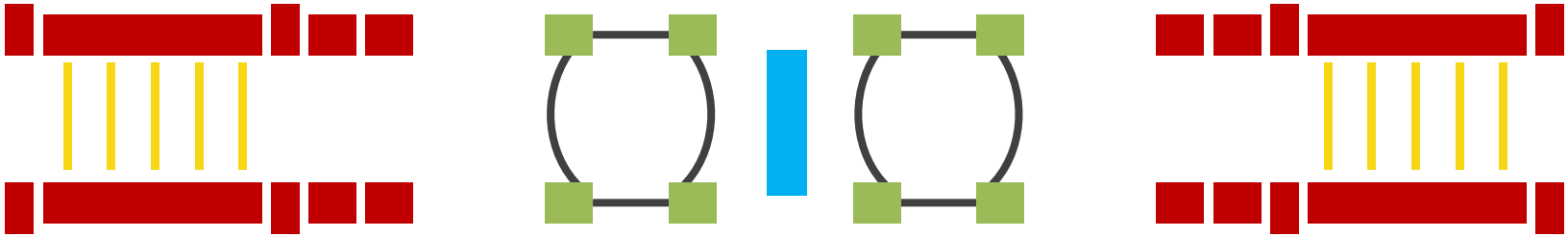
Considered 5 “cases” + nominal Step V:

→ Leave positioning of RF cavities until later (they will fit in gaps)

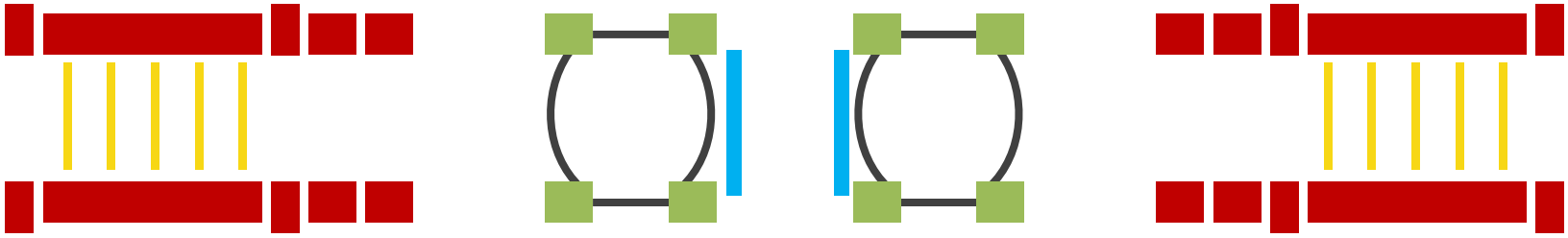
Case 1: 6cm LiH in centre



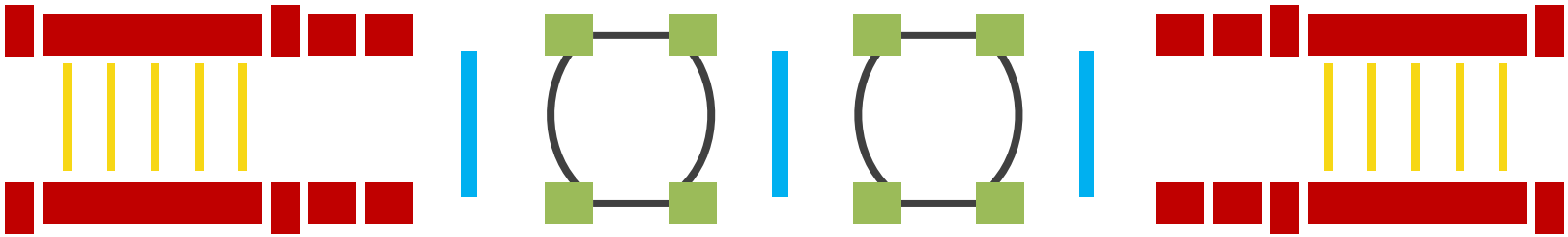
Case 2: 10cm LiH in centre



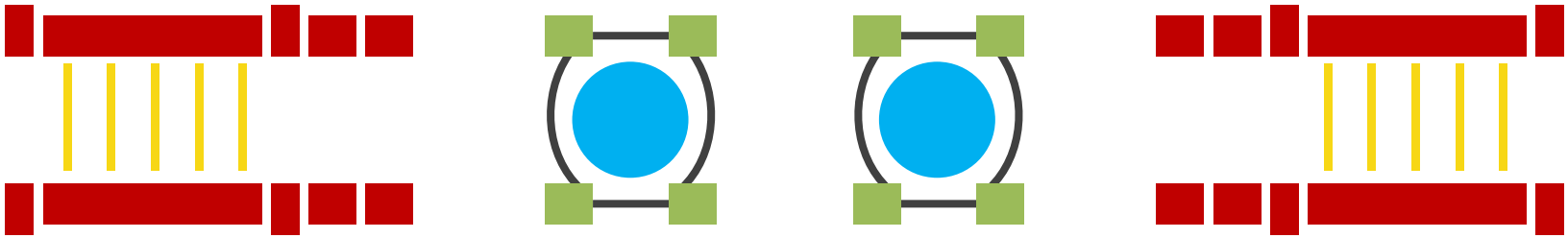
Case 3: 6cm LiH either side of an “RF gap”



Case 4: 6cm LiH at beta minima

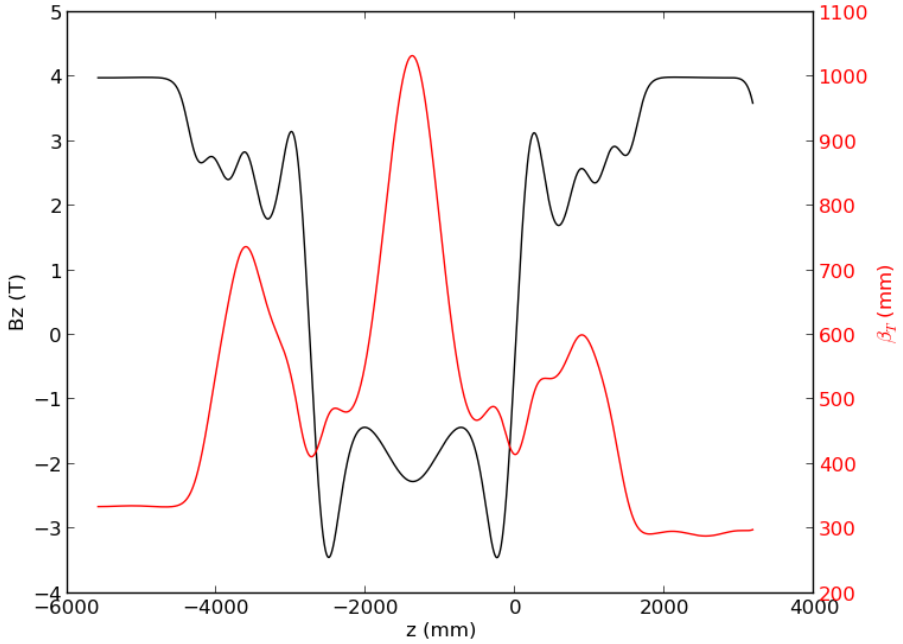


Case 5: Filling the AFC with LH2

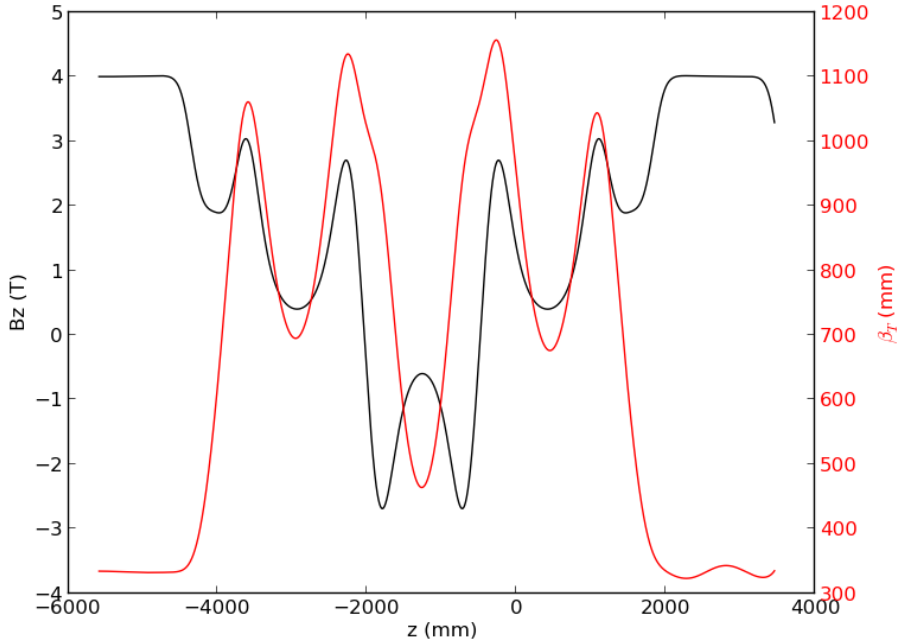


- Following plots are linear optics
  - Approximates emittance reduction through absorber
  - Absorber locations still approximate
- Lattice tracking studies in progress
  - Start with empty lattice and check apertures
  - Pick “best cooling” lattice
  - Optimise for RF space, then add material & track again

NB: Lattice based on guesses given field profile and stated assumptions in http://micewww.pp.rl.ac.uk/attachments/2457/MICE_StepPi_JPasternak.pdf (not exactly the same, but appeared 'good enough' to try)



Nominal Step V at pz = 200MeV/c



Trial lattice at pz = 200MeV/c

↓

"Reasonable" response to range of momenta from 180—220 MeV

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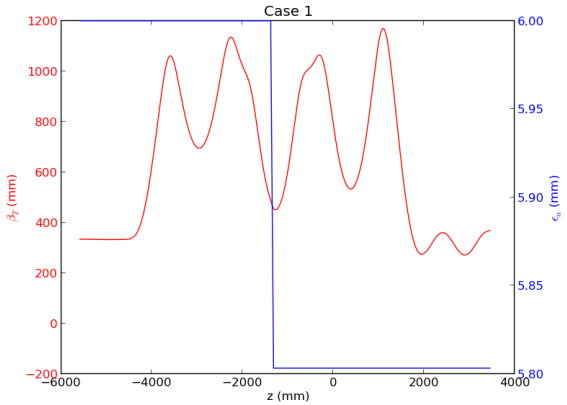
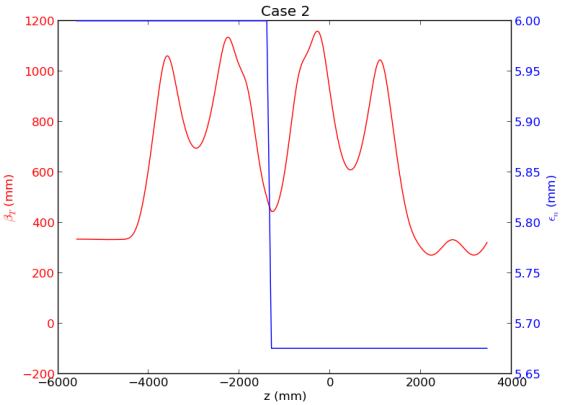
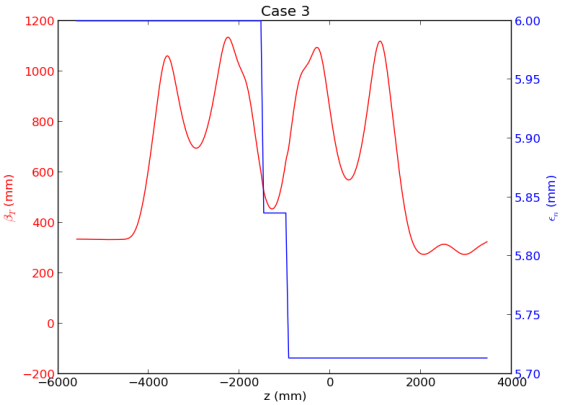
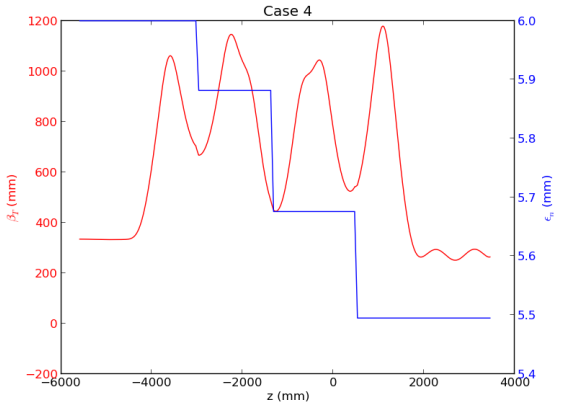
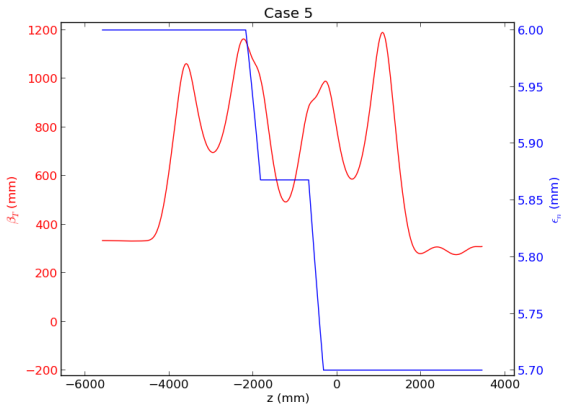
Need to investigate this further with large momentum spread beam during tracking studies

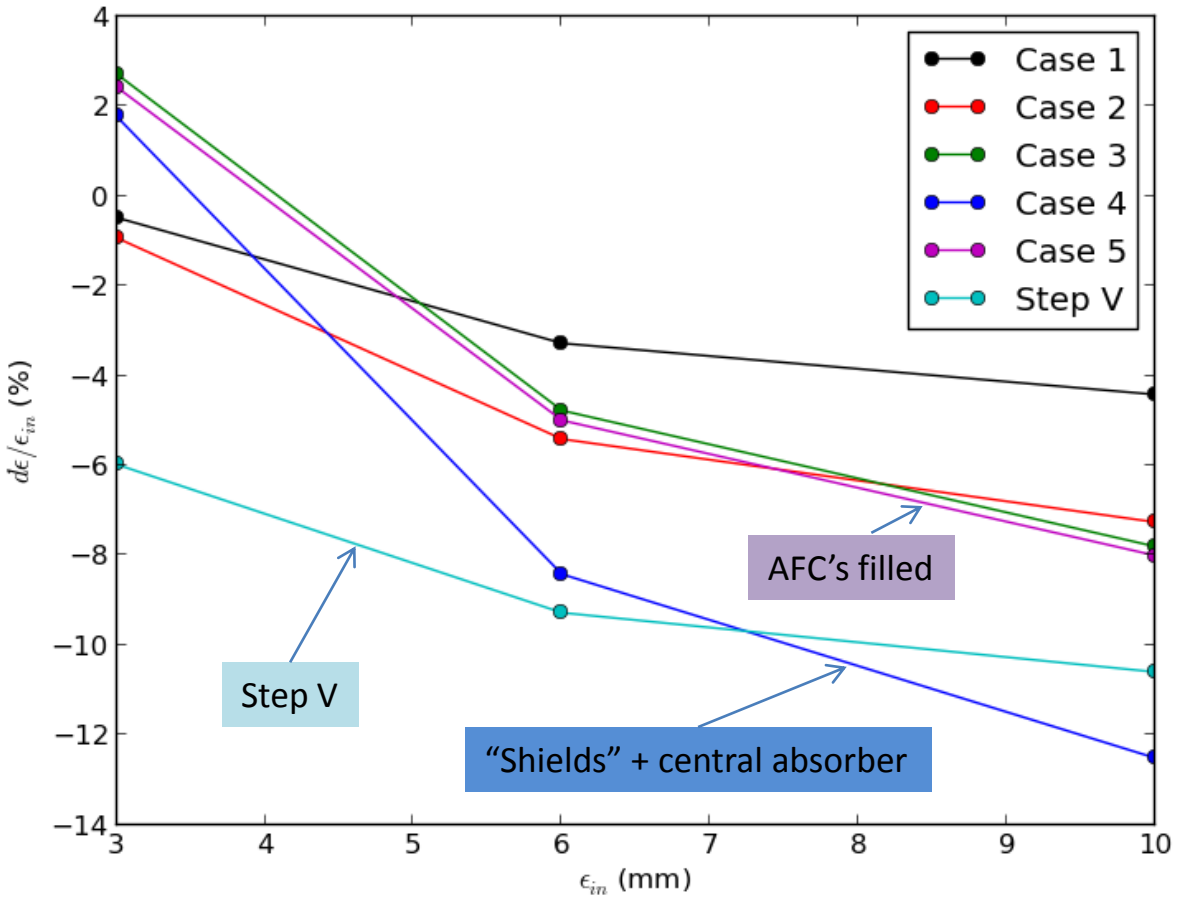

Case 1
z (mm)


Case 2
z (mm)


Case 3
z (mm)


Case 4
z (mm)


Case 5
z (mm)


Case 1
Case 2
Case 3
Case 4
Case 5
Step V
AFC's filled
Step V
"Shields" + central absorber
$d\epsilon/\epsilon_{in}$ (%)
ϵ_{in} (mm)