

Comparison of M1 Off Plots

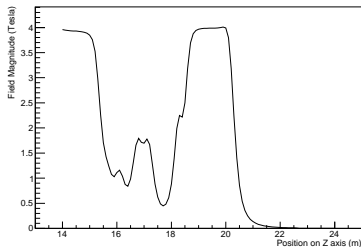
Ryan Bayes

University of Glasgow

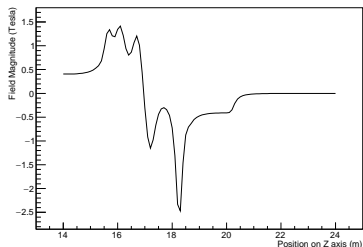
September 22, 2015

Field and Beam Settings

Solenoid Mode Field



Flip Mode Field



Would like to consider

- 200 MeV/c beam
- no momentum spread
- Emittances of 3, 6, 10 mm
- Starting at tracker reference plane (z=14 m)

- See http://micewww.pp.rl.ac.uk/projects/analysis/wiki/2015-09-15_m1_optics_discussion for solenoid currents.

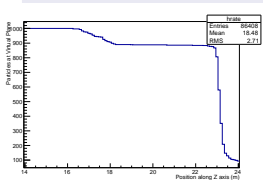
- Used "current" geometry
 - Air in the trackers.
 - Solenoids have a 0.15° US and 0.4° DS misalignment based on survey of flanges
 - Misalignments of field with respect to bore¹ included (but are relatively small).
 - Tracker misalignment is assumed to be derived from the solenoid misalignments
- LiH Disk absorber used ($z = 16995.74$ mm)
- US Tracker: $13.97. \text{ m} < z < 15.07\text{m}$
- DS Tracker: $18.86 \text{ m} < z < 19.97\text{m}$

¹See <https://indico.cern.ch/event/374187/session/6/contribution/29/attachments/745674/1022924/Mapping-CM42s.pdf>

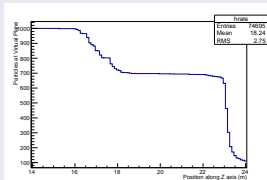
Transmission

Solenoid Mode

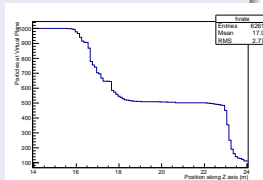
• 3mm emittance



• 6mm emittance

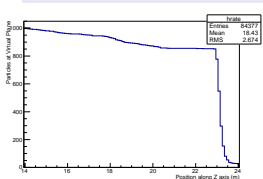


• 10mm emittance

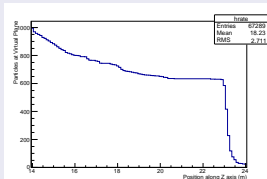


Flip Mode

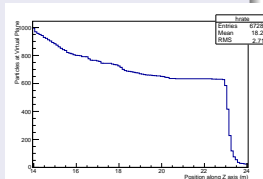
• 3mm emittance



• 6mm emittance



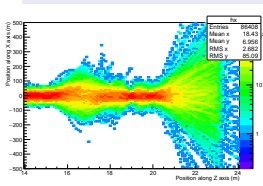
• 10mm emittance



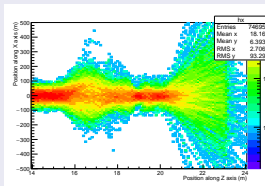
Beam Profile in X-Position

Solenoid Mode

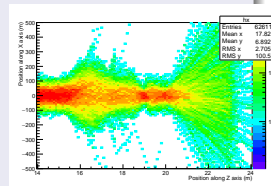
• 3mm emittance



• 6mm emittance

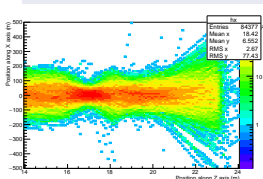


• 10mm emittance

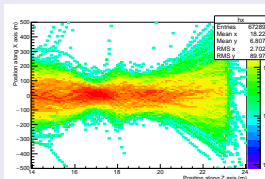


Flip Mode

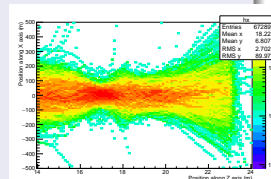
• 3mm emittance



• 6mm emittance



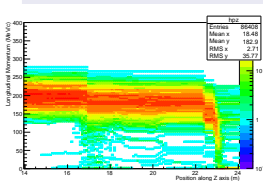
• 10mm emittance



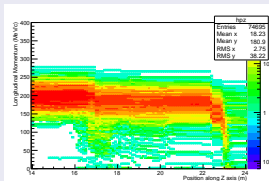
Longitudinal Momentum

Solenoid Mode

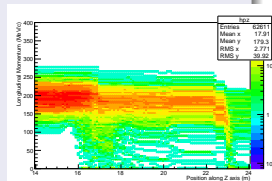
• 3mm emittance



• 6mm emittance

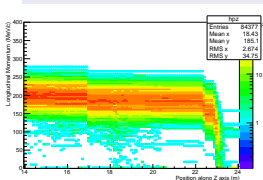


• 10mm emittance

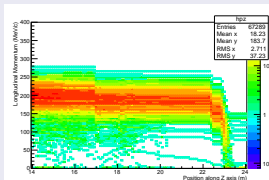


Flip Mode

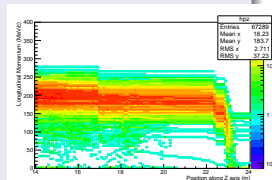
• 3mm emittance



• 6mm emittance



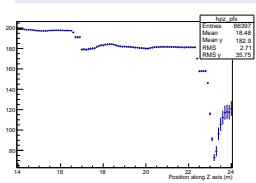
• 10mm emittance



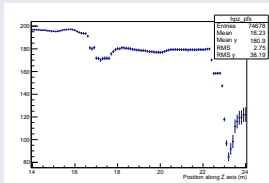
Longitudinal Momentum Profile

Solenoid Mode

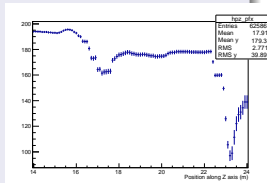
• 3mm emittance



• 6mm emittance

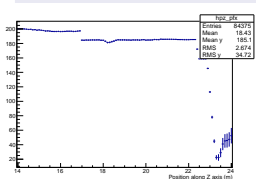


• 10mm emittance

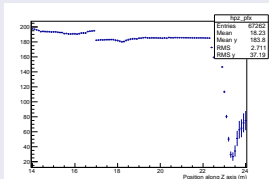


Flip Mode

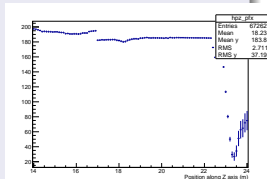
• 3mm emittance



• 6mm emittance



• 10mm emittance



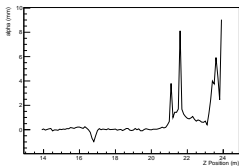
Interim Observations

- Transmission has been reduced to
 - 50% in the "Solenoid" setting at 10 mm emittance.
 - 65% in the "Flip" setting at 10 mm emittance.
- Losses appear to be scattering or stopping at the edges of the beam.
 - Primarily happens in AFC region in Solenoid field.
 - Occurs throughout the Flip field.
- Only selection right now is on PID (require $PDG == -13$)
 - For further analysis should consider a transverse position cut.
 - Should expand to consider reconstruction quality.

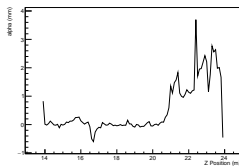
Beam Envelope: α_x

Solenoid Mode

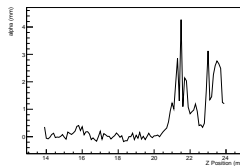
- 3mm emittance



- 6mm emittance

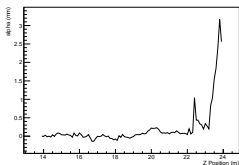


- 10mm emittance

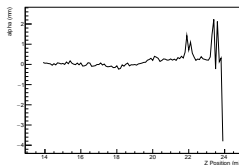


Flip Mode

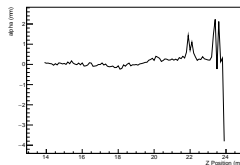
- 3mm emittance



- 6mm emittance



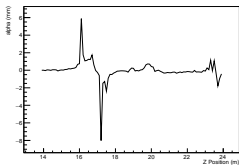
- 10mm emittance



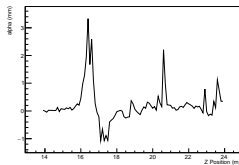
Beam Envelope: α_y

Solenoid Mode

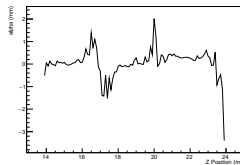
- 3mm emittance



- 6mm emittance

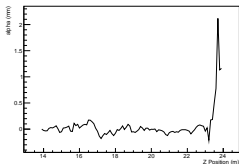


- 10mm emittance

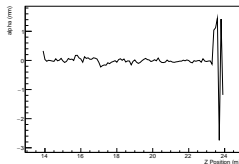


Flip Mode

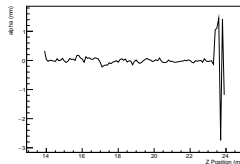
- 3mm emittance



- 6mm emittance



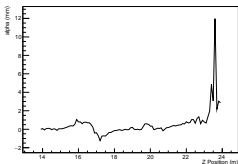
- 10mm emittance



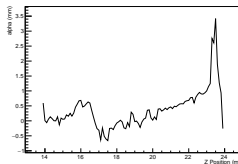
Beam Envelope: α_{4D}

Solenoid Mode

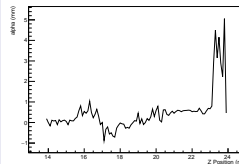
- 3mm emittance



- 6mm emittance

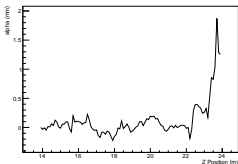


- 10mm emittance

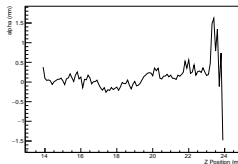


Flip Mode

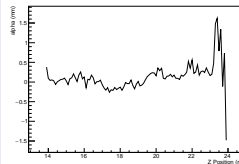
- 3mm emittance



- 6mm emittance



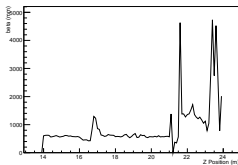
- 10mm emittance



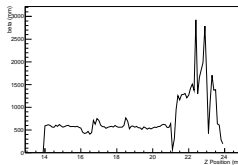
Beam Envelope: β_x

Solenoid Mode

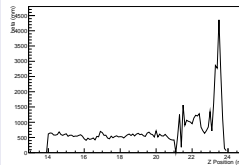
- 3mm emittance



- 6mm emittance

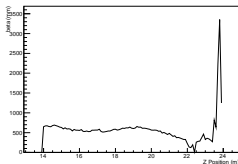


- 10mm emittance

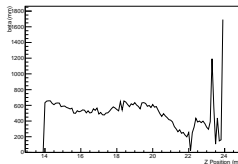


Flip Mode

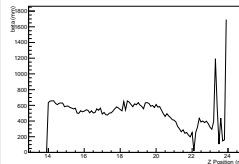
- 3mm emittance



- 6mm emittance



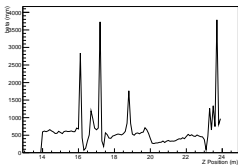
- 10mm emittance



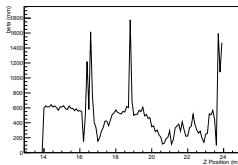
Beam Envelope: β_y

Solenoid Mode

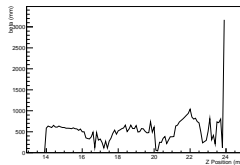
- 3mm emittance



- 6mm emittance

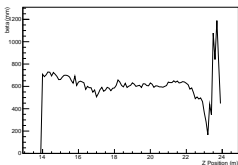


- 10mm emittance

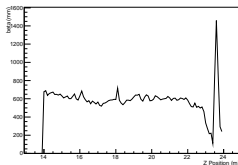


Flip Mode

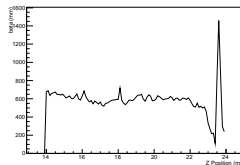
- 3mm emittance



- 6mm emittance



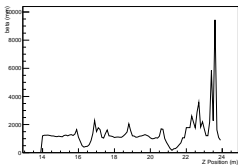
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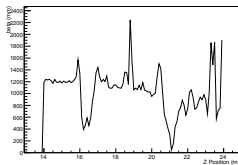
Beam Envelope: β_{4D}

Solenoid Mode

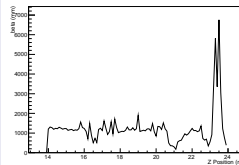
- 3mm emittance



- 6mm emittance

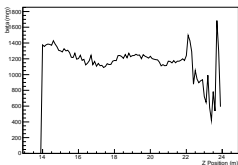


- 10mm emittance

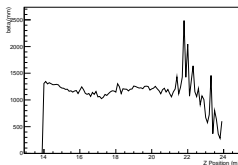


Flip Mode

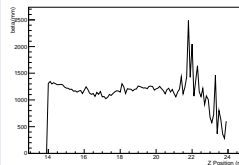
- 3mm emittance



- 6mm emittance

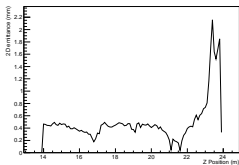


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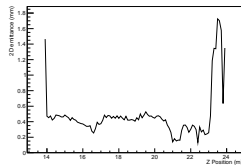


Solenoid Mode

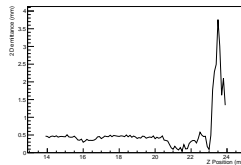
- 3mm emittance



- 6mm emittance

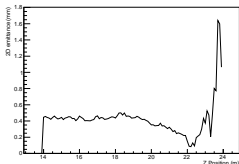


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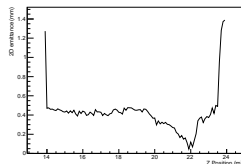


Flip Mode

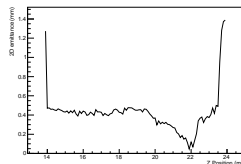
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- 6mm emittance



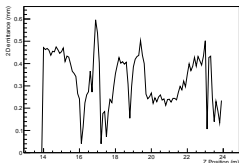
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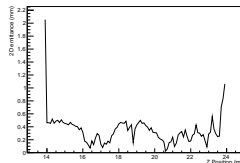
Beam Envelope: ϵ_y

Solenoid Mode

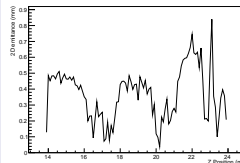
- 3mm emittance



- 6mm emittance

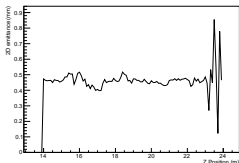


- 10mm emittance

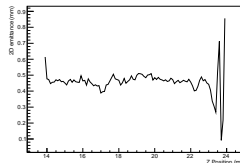


Flip Mode

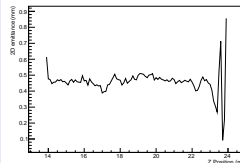
- 3mm emittance



- 6mm emittance



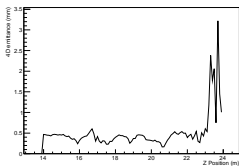
- 10mm emittance



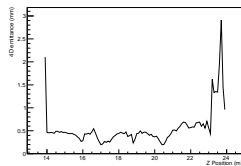
Beam Envelope: ϵ_{4D}

Solenoid Mode

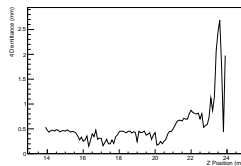
- 3mm emittance



- 6mm emittance

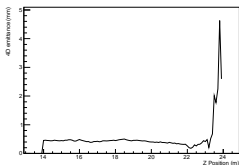


- 10mm emittance

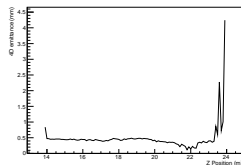


Flip Mode

- 3mm emittance



- 6mm emittance



- 10mm emittance

