Beam Pre-Commissioning at Step IV

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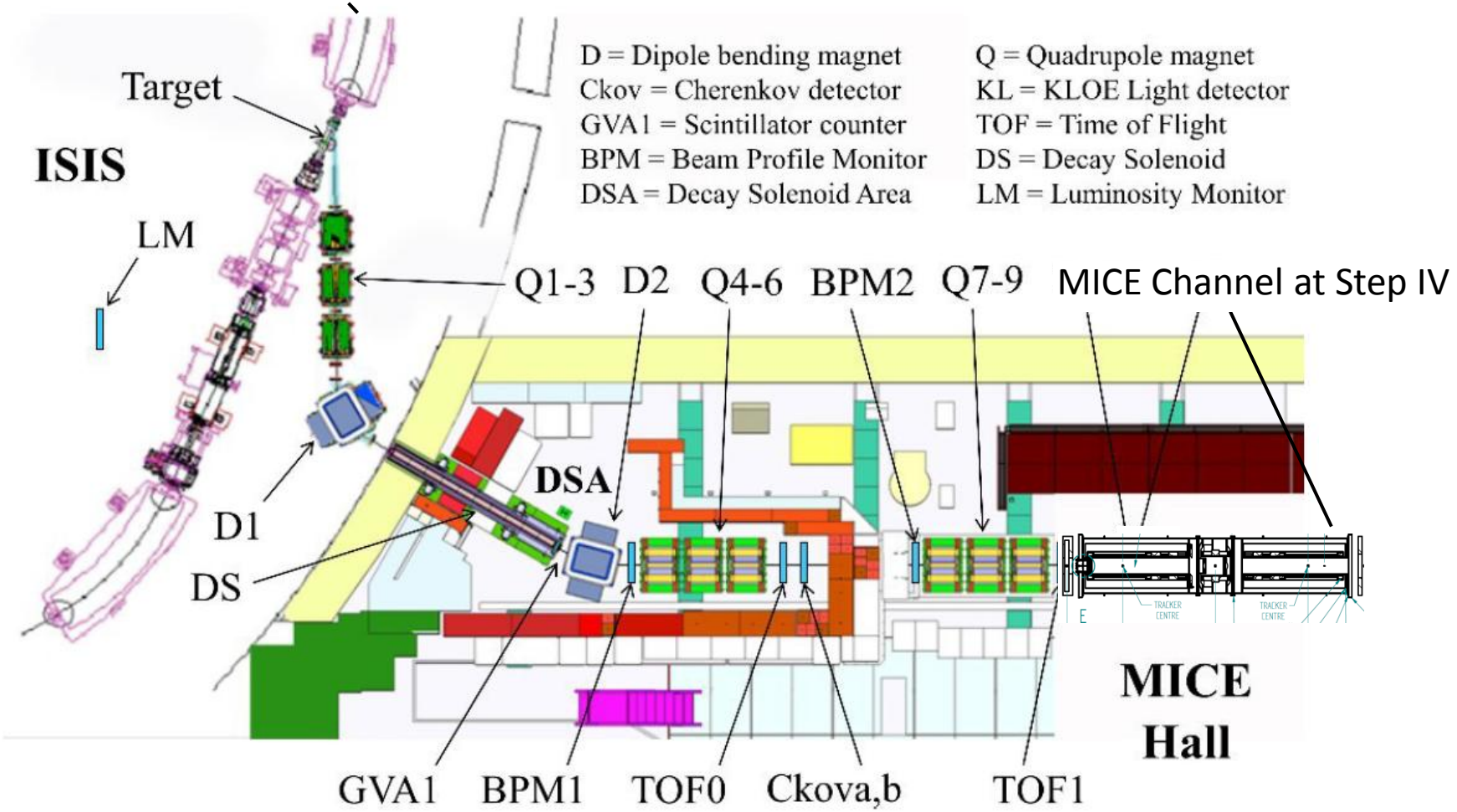
Outline

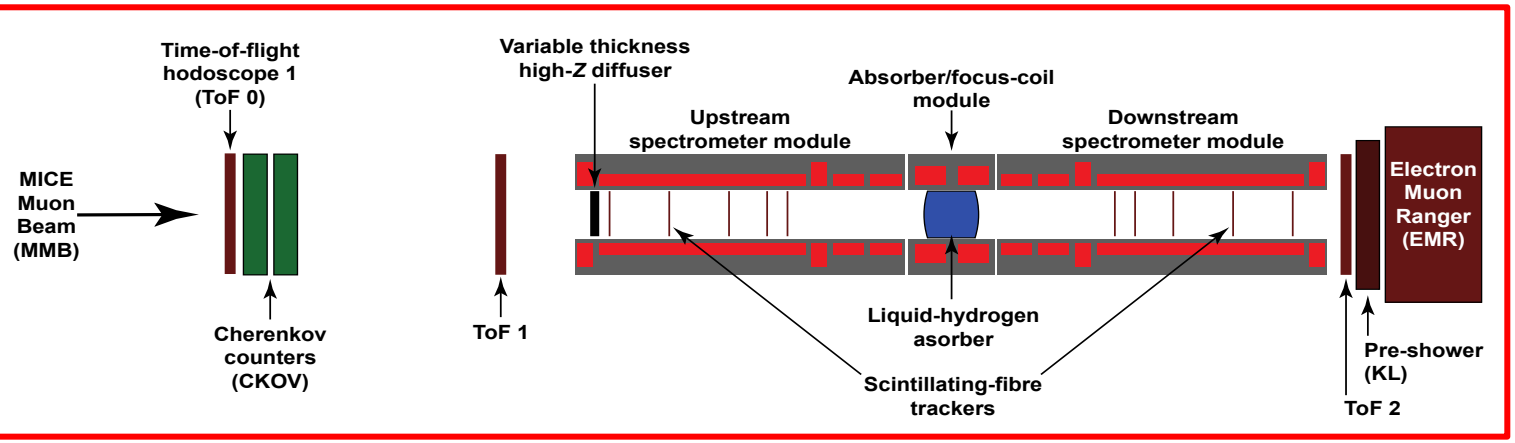
- Introduction
- Data taken so far
- Next steps

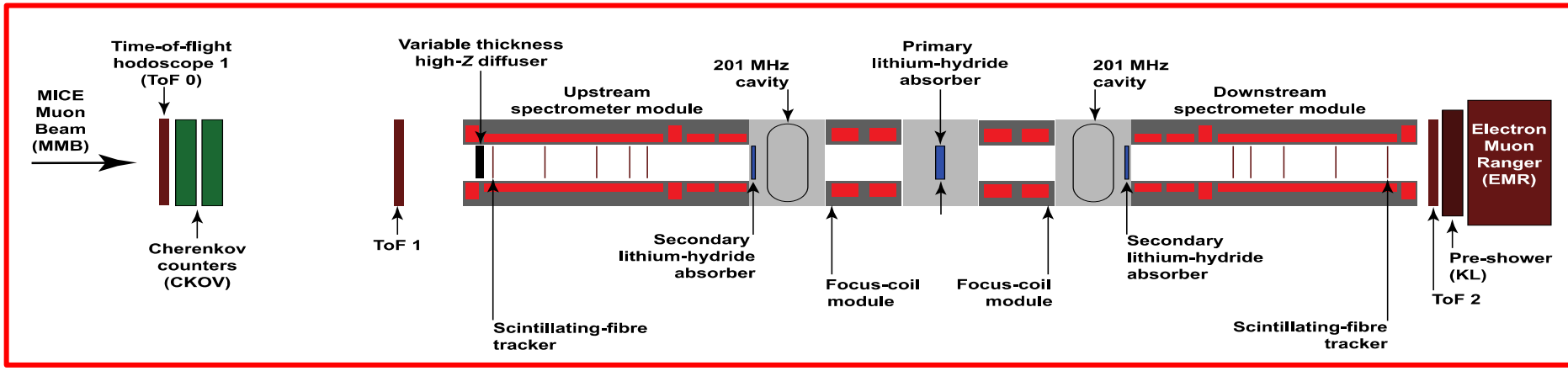
Introduction



MICE Beam Line
Conceptual Layout

Introduction (2)





MICE Step IV and Cooling Demonstration

Vocabulary

- Beamline pre-commissioning: Repeat of Step I phase space reconstruction with new beamline settings (taking into account Diffuser modifications and special settings)
- Magnet Commissioning: commissioning of all the systems required to have the MICE Cooling Channel ready for beam (includes, QD/QP system, electrical tests, magnet training etc.)
- Beamline commissioning: commissioning of beamline and USS optics matching including the effect of the Diffuser (requires SSU magnetic field and Tracker, both commissioned)
- MICE Cooling Channel commissioning: assessment of MICE Channel optics, alignment with empty absorber.

Beam line Pre-Commissioning

- Required to test new beam settings for the operations and Tracker commissioning without B field -> started!
- Hardware needs to be re-tested -> done!
  - Nothing new beyond Step I operations, however hardware not used for many months
- Step I setting needs to be repeated (~10k useful triggers) -> done (analysis ongoing)! Good outcome expected!
  - Again to test if nothing changed! It will also allow to cross-check with improved MC modelling
- Updated momentum settings need to be tested against matching at TOF0 with Step I tomography ->started, however no break through can be claimed yet!
  - Requires new settings to be developed and their MC performed (ASAP)
  - Requires DS, proton absorber, all beam line magnets, TOF0 and TOF1
- Large beta (beam size) setting for Tracker commissioning without magnetic field needs to be tested -> two initial setting were tested, but unsuccessful (this allowed to create the 3rd setting, which awaits experimental testing when DS is back.
- In summary: 10h of useful beam including tuning time and contingency -> 4 shifts (data taking is only a small fraction of the estimated time)
  - May need to be repeated ->8 shifts, the time may be shared with Trackers (3 useful shifts taken up to date)
  - Should be done before the Magnet Commissioning (we still have a chance)

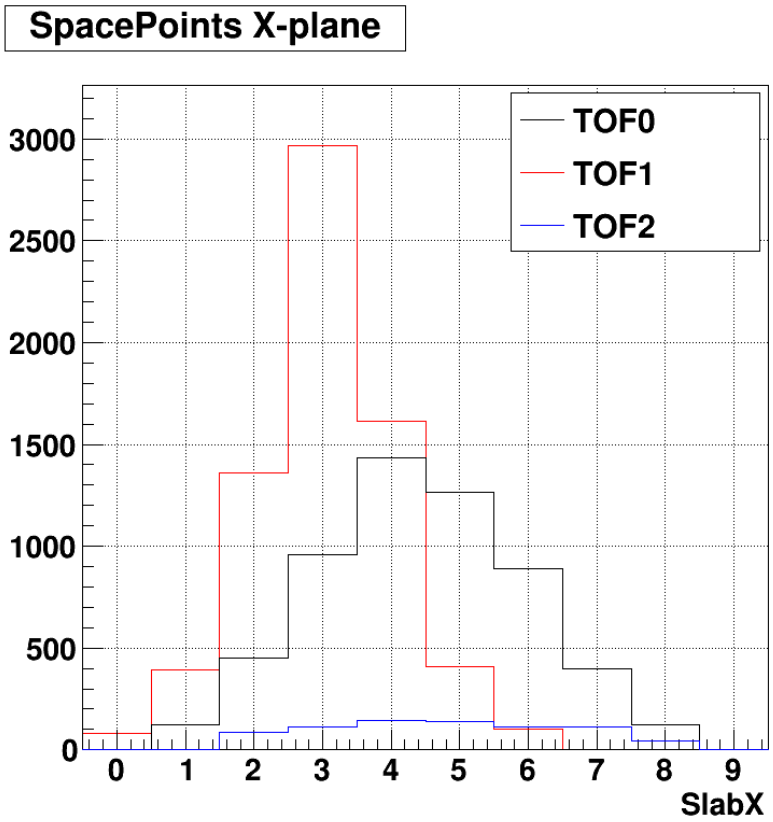
Data taken so far

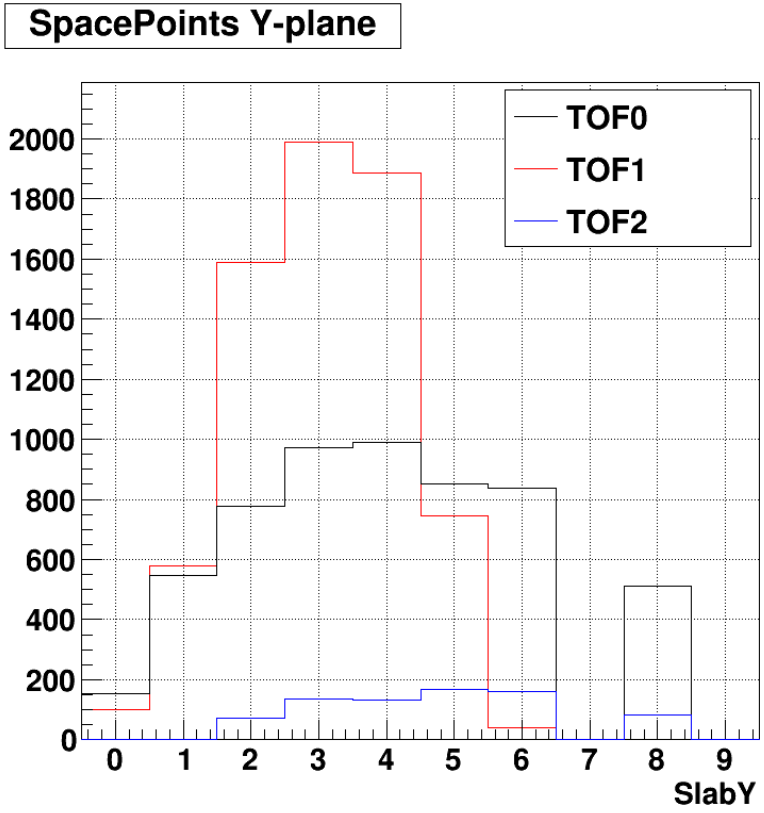
- 19th of April – Q123 scan without DS (unfortunately Scalars were disconnected so absolute normalization to beam loss not possible)
- 25th-26th April –muon settings
  - Step I setting tests: M0 for 140, 200 and 240 MeV/c
  - Settings for downstream detector commissioning without B field
  - First settings for testing matching into the Channel
- 2nd of June – Q123 scan with DS

Data taken so far

- Software analysis tool to perform phase space reconstruction has been created (V. Blackmore), but data analysis still need to be performed.
- Q123 scan on 2nd of June: preliminary analysis performed (R. Bayes), however it was recommended to await new MAUS to re-evaluate.

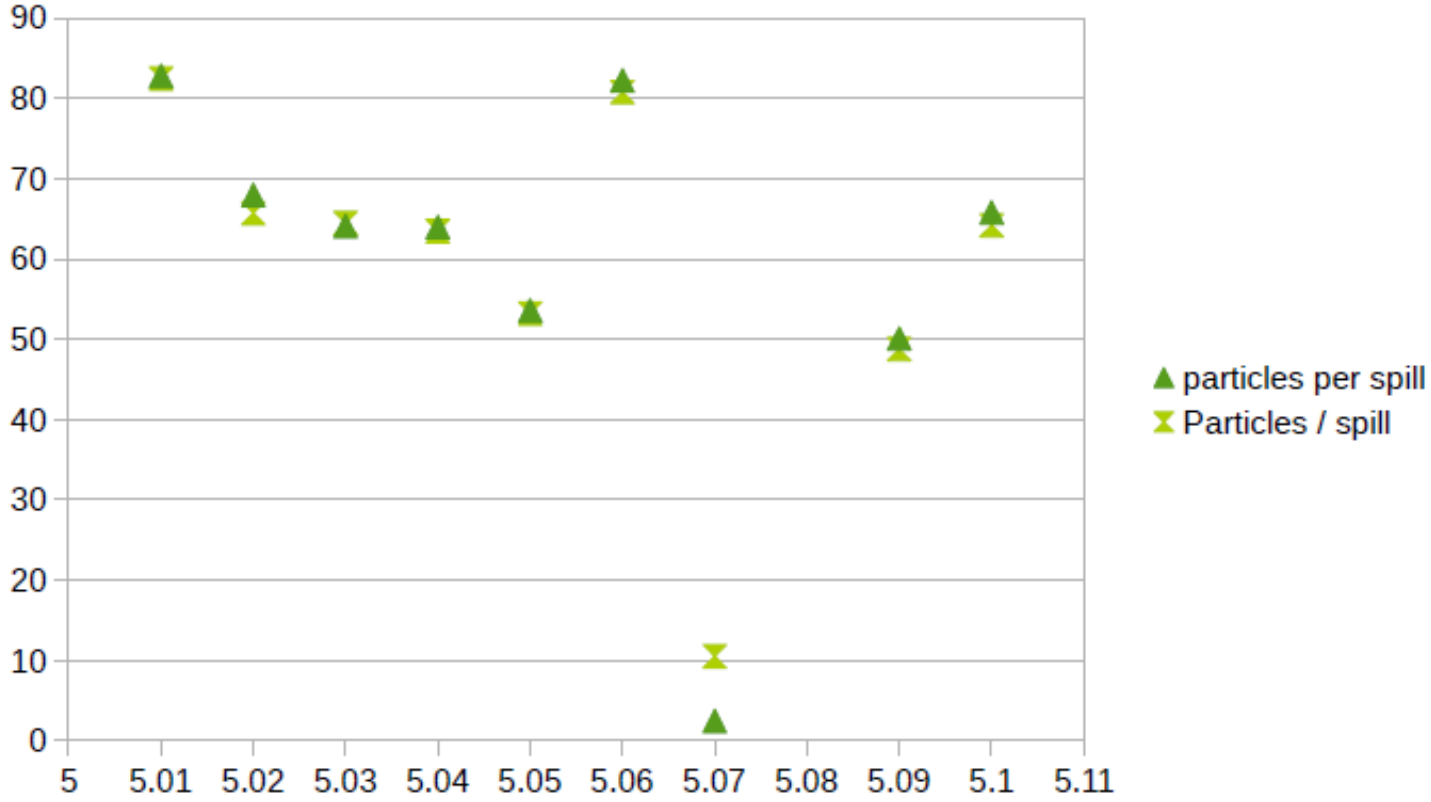
Step I 200 MeV/c setting (OnRec)





Missing slab 7

Preliminary analysis of Q123 scan with DS on (R. Bayes)



Summary

- Pre-commissioning used 3 useful shifts.
- Step I setting has been repeated (analysis ongoing).
- New settings for commissioning without B field not successful, however new setting was created based on experience gained (awaiting DS back to be tested).
- New matching settings are being created-> we hope to continue the effort in June operations.
- Preliminary Q123 scan shows that upstream beamline is well optimised already (however we do not gave up yet!)