International MUON Collider Collaboration

CERN

MDI – detector update

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Status

- BIB simulation available for a clockwise muon+ beam (10 TeV collider)
- μ^- simulation in the pipeline → 1st try failed:
  - Degugging ongoing
  - Few non-problematic issues solved

μ- simulation

- 180 jobs requested, 4 cycles per job, 200 decays per cycle
- Few hiccups here and there (as usual)

```
INDEX '-8' OF DIMENSION 1 OF ARRAY
'AM' BELOW LOWER BOUND OF -6
```

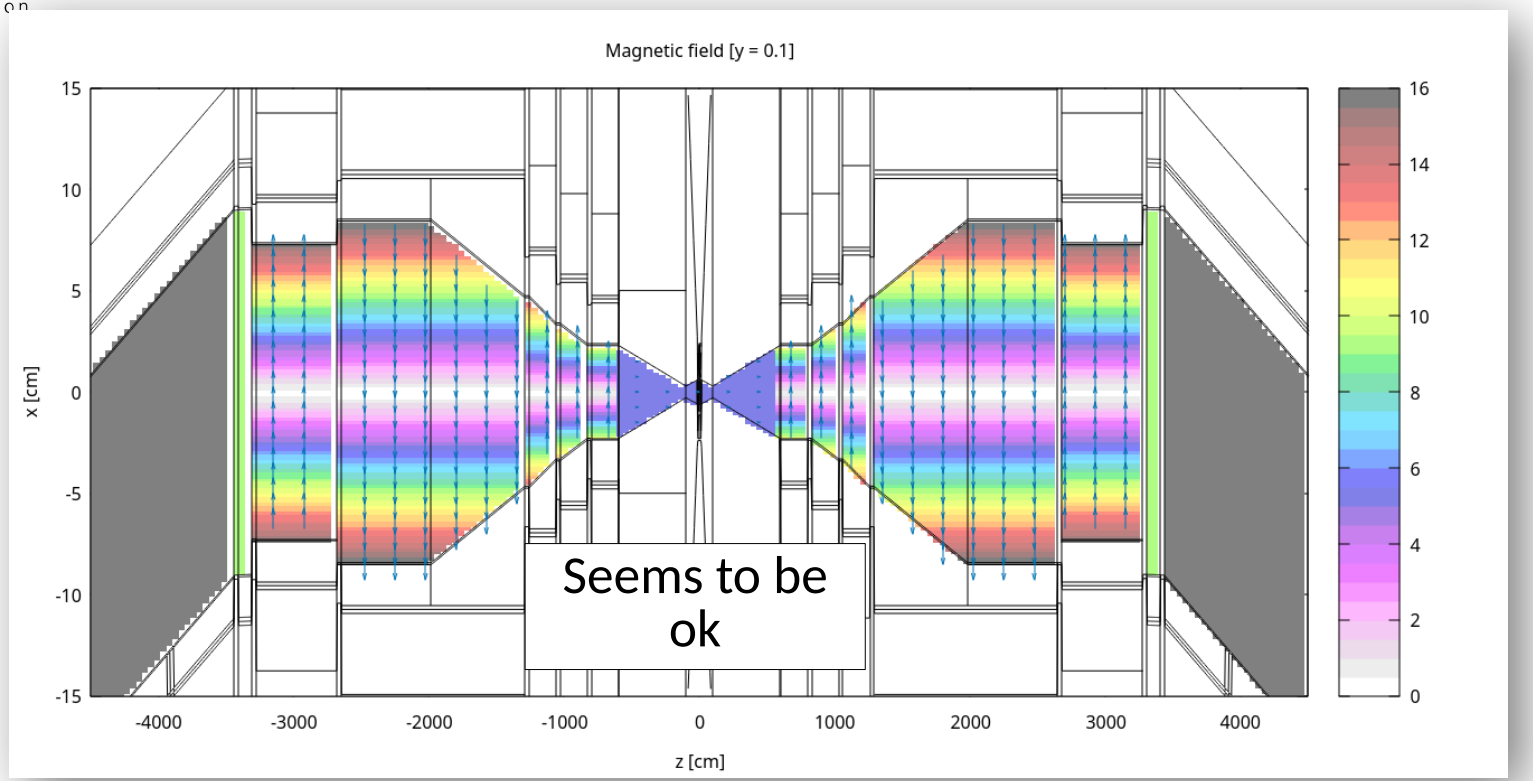
```
=== run0008 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0009 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0010 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) ### CRASHED #### #004 ( *** CORE *** )
=== run0011 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0012 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0013 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0014 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
```

```
=== run0046 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0047 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0048 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 ) ### RUN TERMINATED DUE TO UNKNOWN REASON ####
=== run0049 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
=== run0050 ===  #001 ( 200 ) #002 ( 200 ) #003 ( 200 ) #004 ( 200 )
```

μ- simulation: fail & debug ongoing

- The results are off by a significant factor. Before showing you any results here I want to be sure I am not messing something up.
- The debug is ongoing, two are the usual suspects:
  - The polarization of the magnetic field in the final focusing quadupoles
  - The sampling routine

Magnetic field in the quadrupoles



Few bugs spotted

Minor contribution, should not really matter

```
      YPCORR = YP / BETBET
-     ZPCORR = SQRT ( ONEONE - XPCORR - YPCORR )
+     ZPCORR = SQRT ( ONEONE - XPCORR**2 - YPCORR**2 )
 *  ROTATION PART: the first step is to generate the beam axis from the
```

Huge contribution outside of the final focus (dispersion was not included in the μ^+ simulation)

```
 *  |     from normalised to real coordinates:
       DXX = CSIDSP * SIGDPP * DISX(NPOS) * 1.0D+02                ! [cm]
-      DXP = CSIDSP * SIGDPP * DISY(NPOS)                          ! []
-      DYY = CSIDSP * SIGDPP * DISPX(NPOS) * 1.0D+02               ! [cm]
+      DXP = CSIDSP * SIGDPP * DISPX(NPOS)                          ! []
+      DYY = CSIDSP * SIGDPP * DISY(NPOS) * 1.0D+02                ! [cm]
       DYP = CSIDSP * SIGDPP * DISPY(NPOS)                         ! []
 *  |     add contribution:
```

Conclusions

- Debug ongoing: I am trying to pinpoint where the simulation failed in the first place.
- Few bugs spotted in the code. This result is good per se, and I will check if they solve the matter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Thank you
for your attention!