

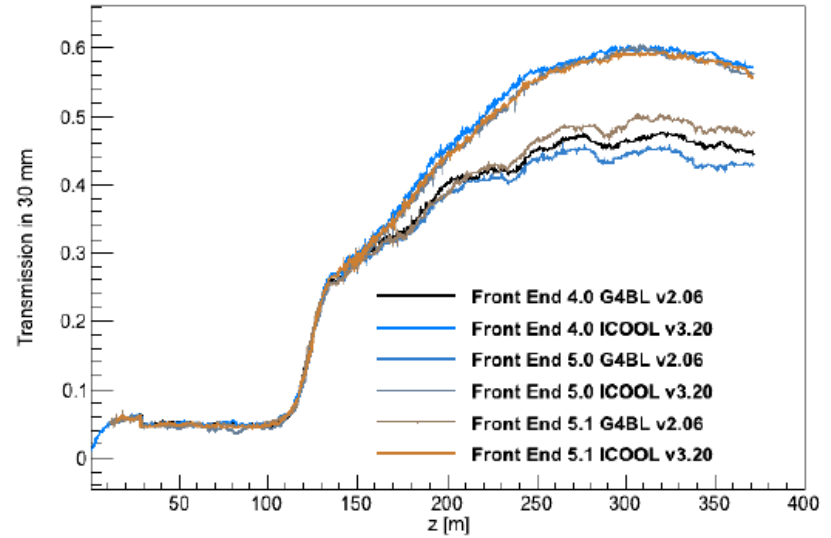
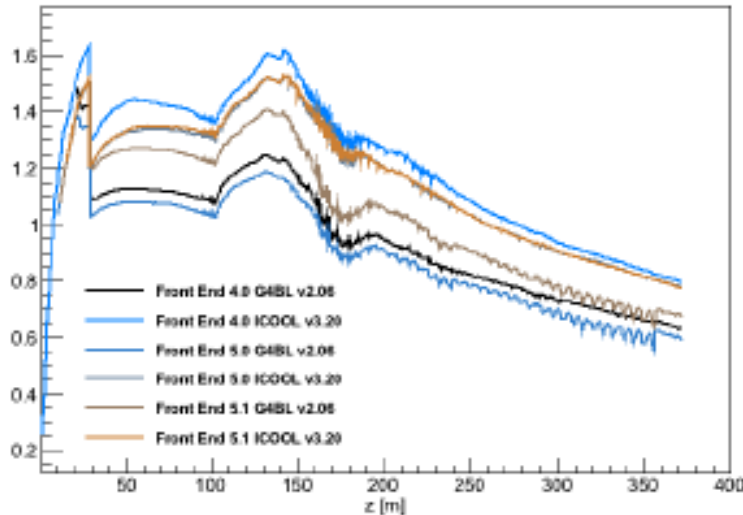
Chicane simulation update

Pavel Snopok

Front end phone meeting

December 10, 2013

FE simulation discrepancy

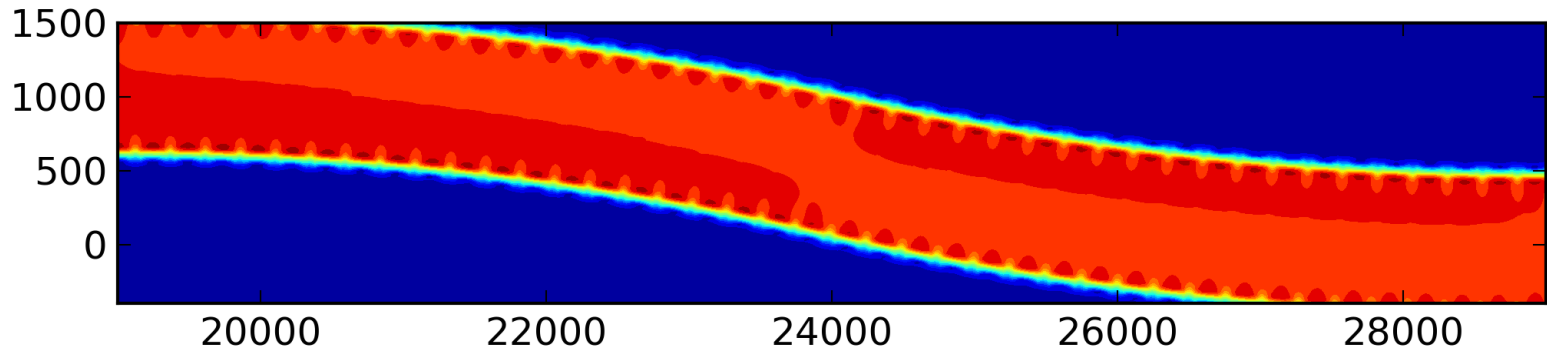


- It was indicated that there is a discrepancy in the FE simulation results between ICOOL and G4beamline.
- It was suggested that the chicane model in ICOOL (two bent solenoids as opposed to the individual coils in G4beamline) is the source of the issue.
- It was suggested that the issue is investigated by generating a field map of the chicane in G4beamline and using this map in ICOOL instead of the bent solenoids.

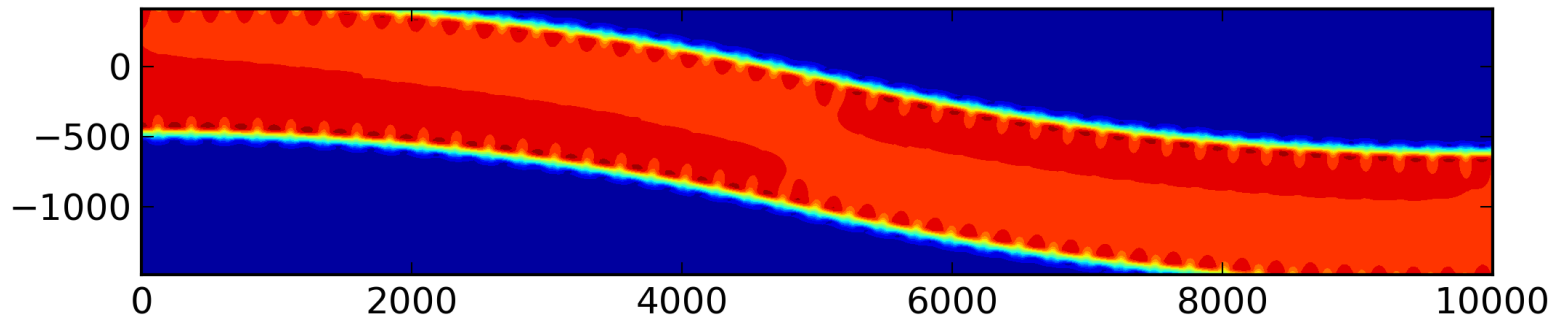
Field map generation

- Field map is generated for the chicane only using the G4beamline deck as is (v5.1).
- Coordinates of the map are modified accordingly to match the ICOOL region:
 - $z = 19 \text{ m} \Rightarrow 0$,
 - $x = 1.086 \text{ m} \Rightarrow 0$.
- This way the only changes in the ICOOL deck are
 - remove the bent solenoids;
 - add DVAR command at the downstream end of the map to compensate for the horizontal beam offset.
- A word of caution: ICOOL guide suggests max grid size is $501 \times 101 \times 101$, while in the code it is $500 \times 100 \times 100$, larger numbers generate a subtle error message. Fixed by Scott, but be careful when using the older version of ICOOL.

Field map as imported into ICOOL

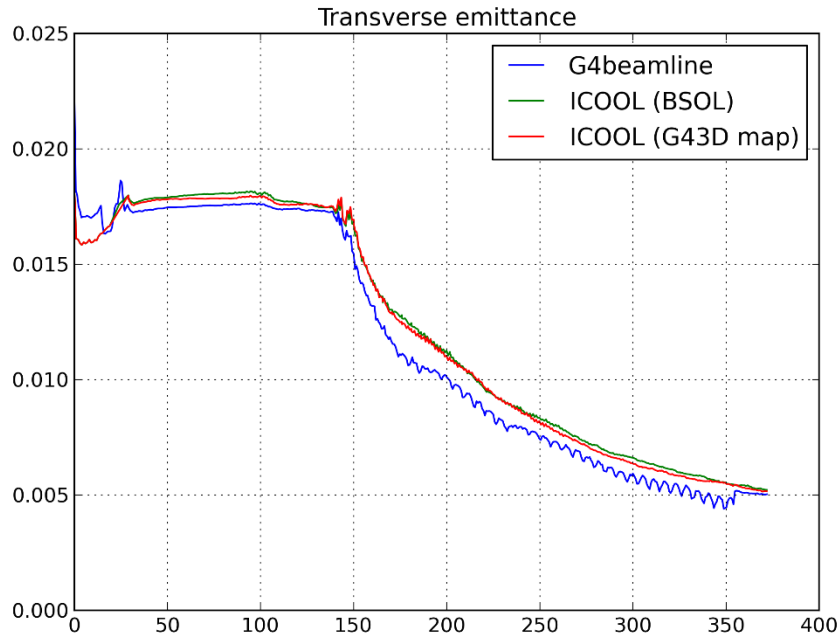


As exported from G4beamline

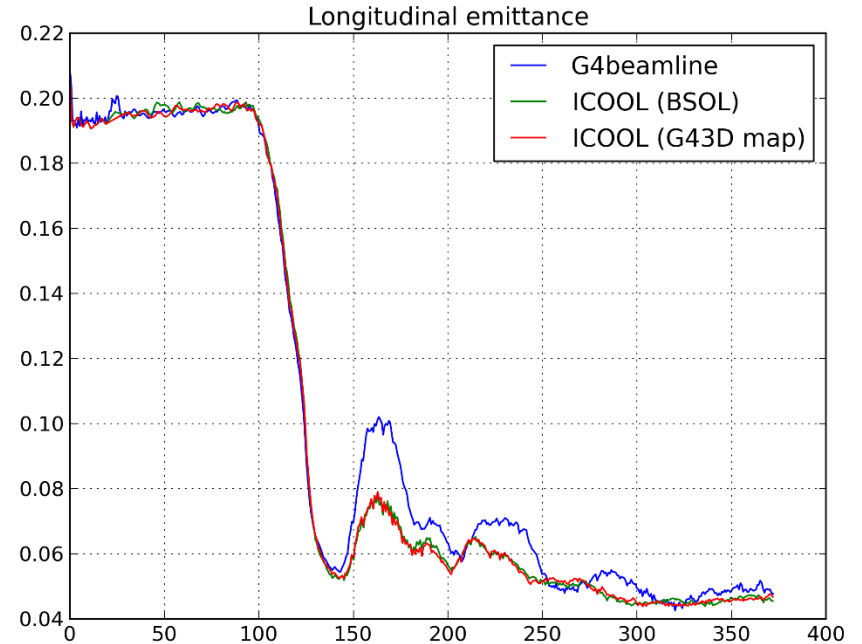


As imported into ICOOL

ICOOOL with BSOL vs G43D map

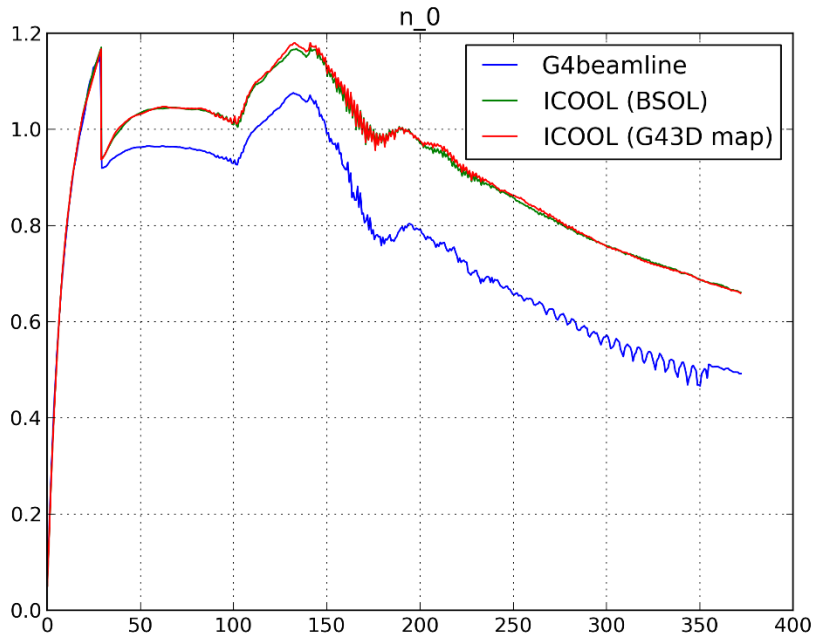


Transverse emittance

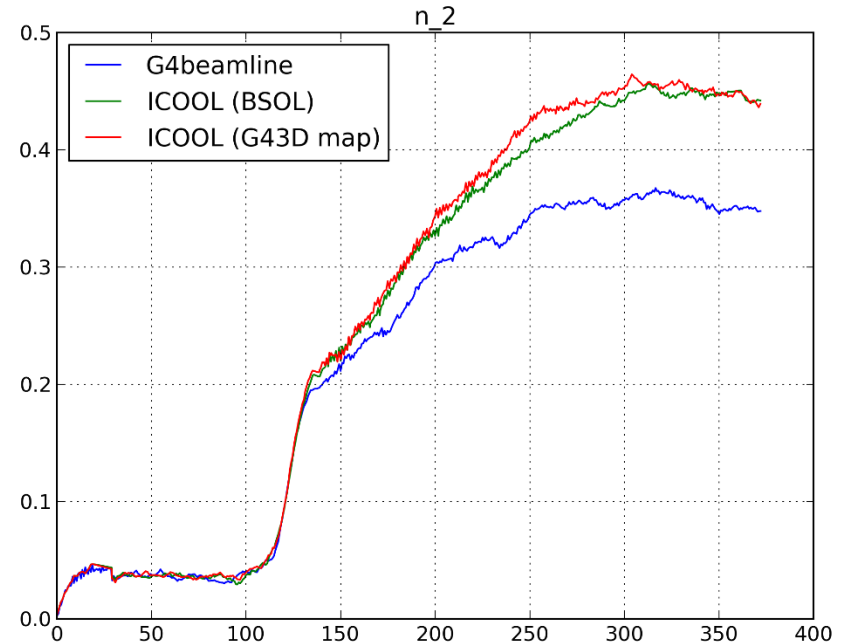


Longitudinal emittance

ICOOOL with BSOL vs G43D map



Number of muons



Number of useful muons
within canonical cuts

Relatively large statistics: 300k incident particles, correct distribution
(wrong distribution sent earlier by email, no 2 ns correction to time)

Conclusions

- ICOOL simulation with bent solenoids and 3D field map for the chicane generated by G4beamline produce the same result.
- Bent solenoid approximation is adequate.
- Chicane is not the source of discrepancy.
- Haven't taken into account the Be proton absorber, but it is unlikely that the absorber is responsible for such a difference in transmission.
- I will continue comparing the elements of the channel downstream of the chicane.