Towards MC/data comparison. An introduction

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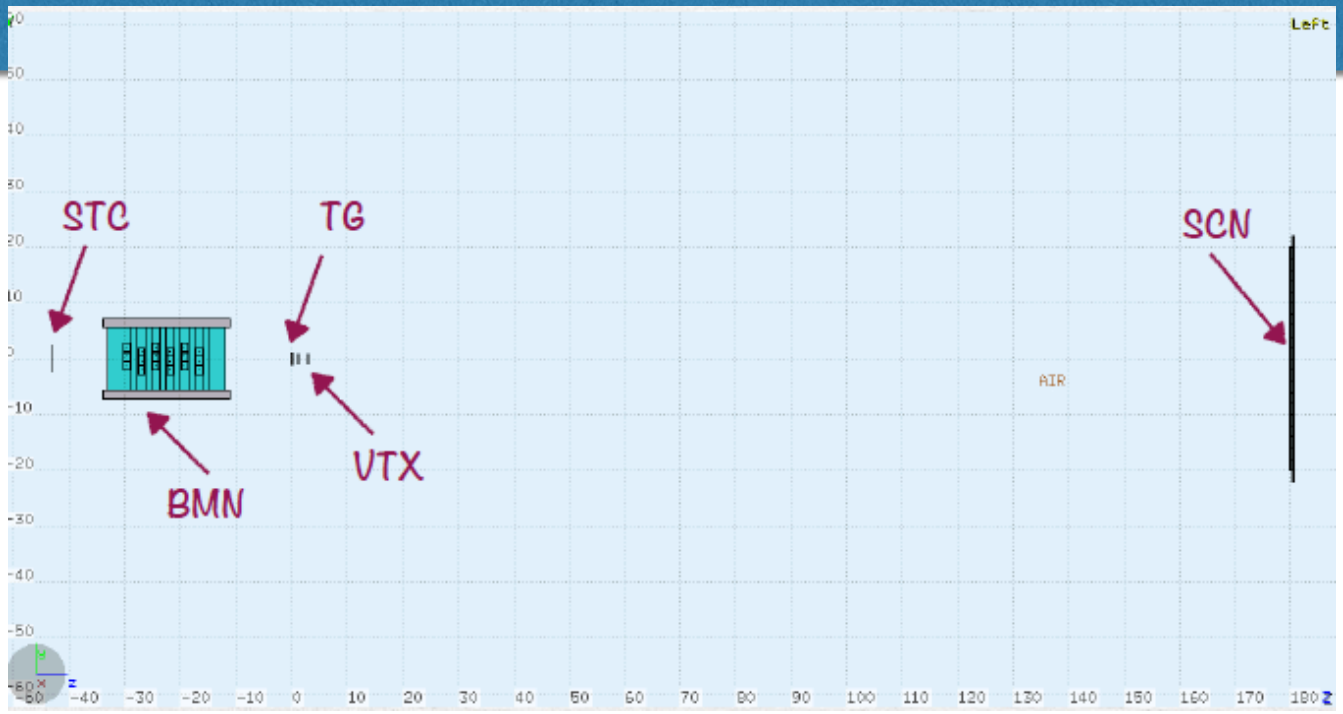
GSI April 2019



/gpfs_data/local/foot/Simulation/GSI2019

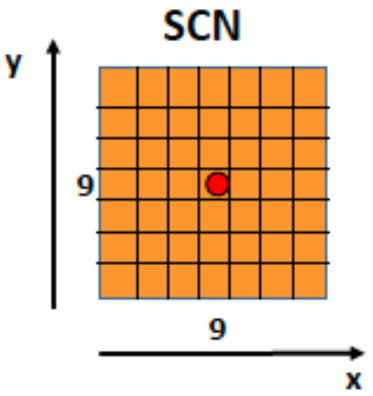
^{16}O on C target (5 mm with density 1.83 g/cm^3) at 200 and 400 MeV/u. 2 root files for each case. 2x10^7 primaries in total for each energy.

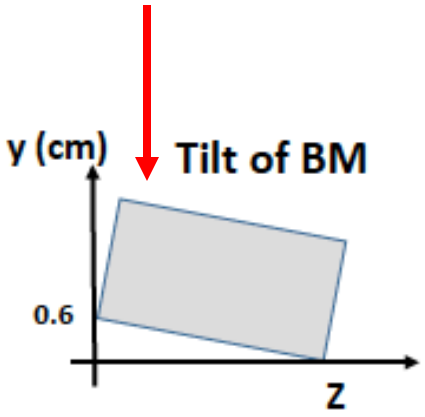
GSI April 2019

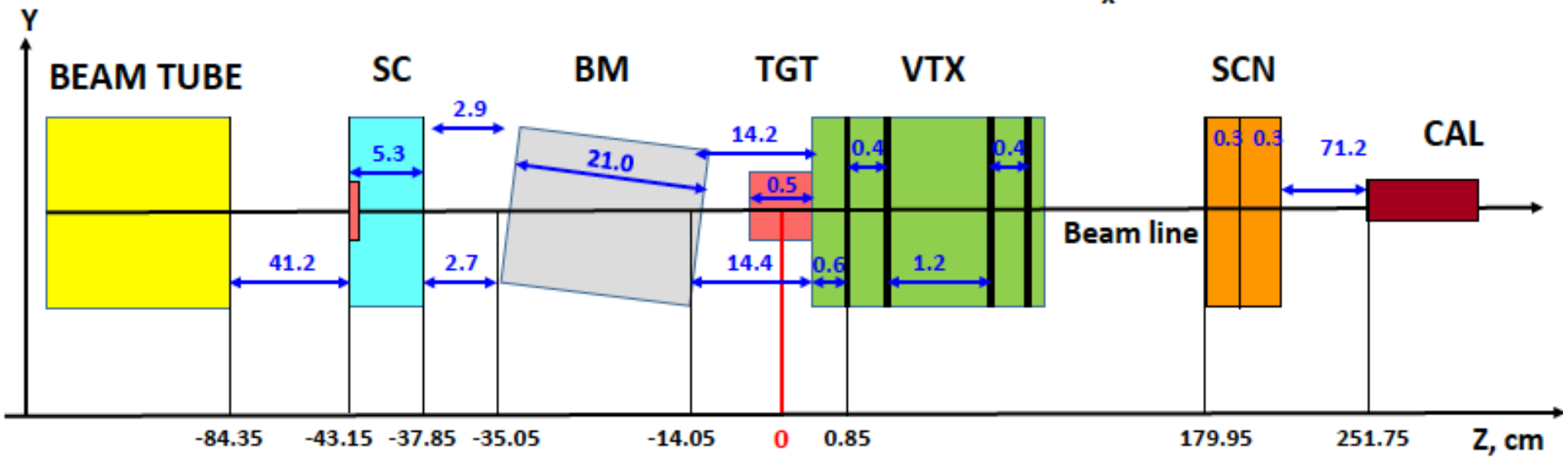
We have positively tested the tilt of BM, but it's not in the present prodution.

Does somebody need it?

- ZERO of the apparatus in the middle of the target
- SC: scintillator of 250 μm depth
- TARGET: 5mm depth, C material (ρ =1.83 gr/cm³)
- VTX: 4 Si layers each of 50 μm depth:
- SCN: 2 layers each 3 mm (lenght 44 cm, active 40 cm)
- SCN: centered in the middle of the slabs (9, 9)







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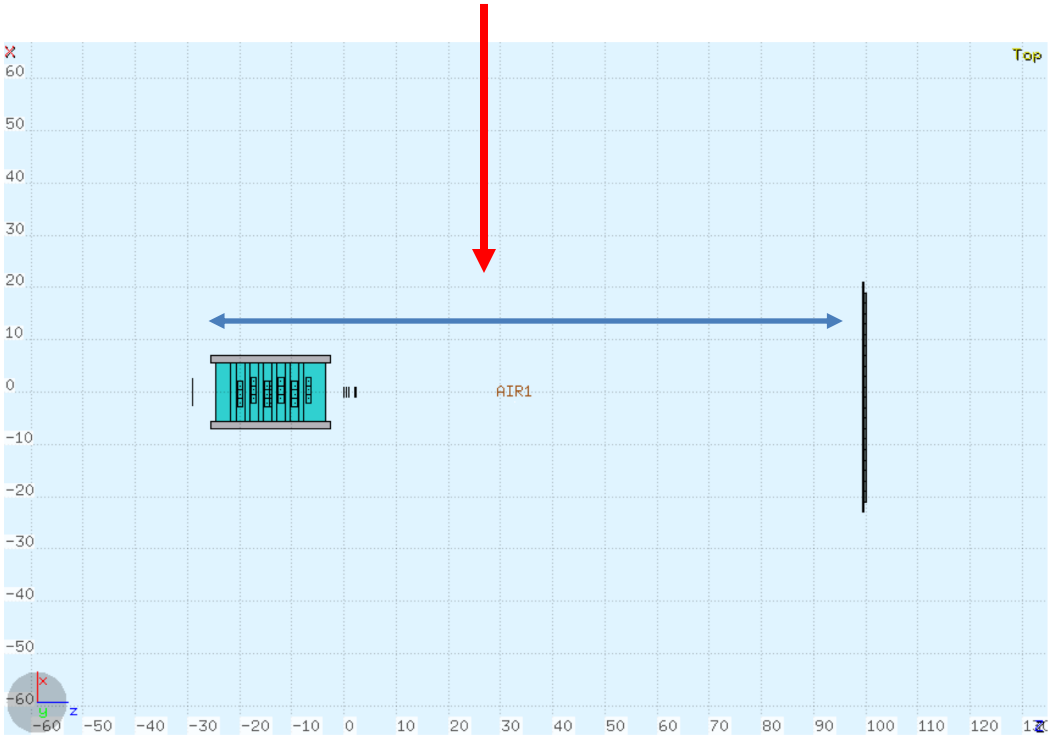
Warning: producing now GSI geometry with makegeo –exp GSI in master branch does not reproduce thc correct geometry

Now distance between TW and STC is too short (~1.3 m).
Months ago it was correct. Something was modified in the wrong way



Signaled by Aafke Kraan

GSI April 2019

Main goals:

DeltaE-Tof
Beam monitor
Vertex

→ Bologna – Pisa - Roma

DeltaE: **Pisa would like a different numbering order of scint bars in simulation**
Do Bologna and Pisa use different tools as far as calibration is concerned?

If needed numbering of bars in MC can be easily changed starting from Simulation/geomaps/TATWdetector.map

Beam monitor:

- do we need a simulation with tilt?
- From Yun: in MC matching bewteen BM and VTX is achieved.

Vertex:

- As established in the past, many fundamental instrumental effects are not present in MC

New public FLUKA (beta) version 2020.0

It includes all features already present in the last development version 2018.2 (not accessible to public) plus more recent additions

Used to produce GSI root-ples already available to FOOT

Some of these additions are of interest for FOOT

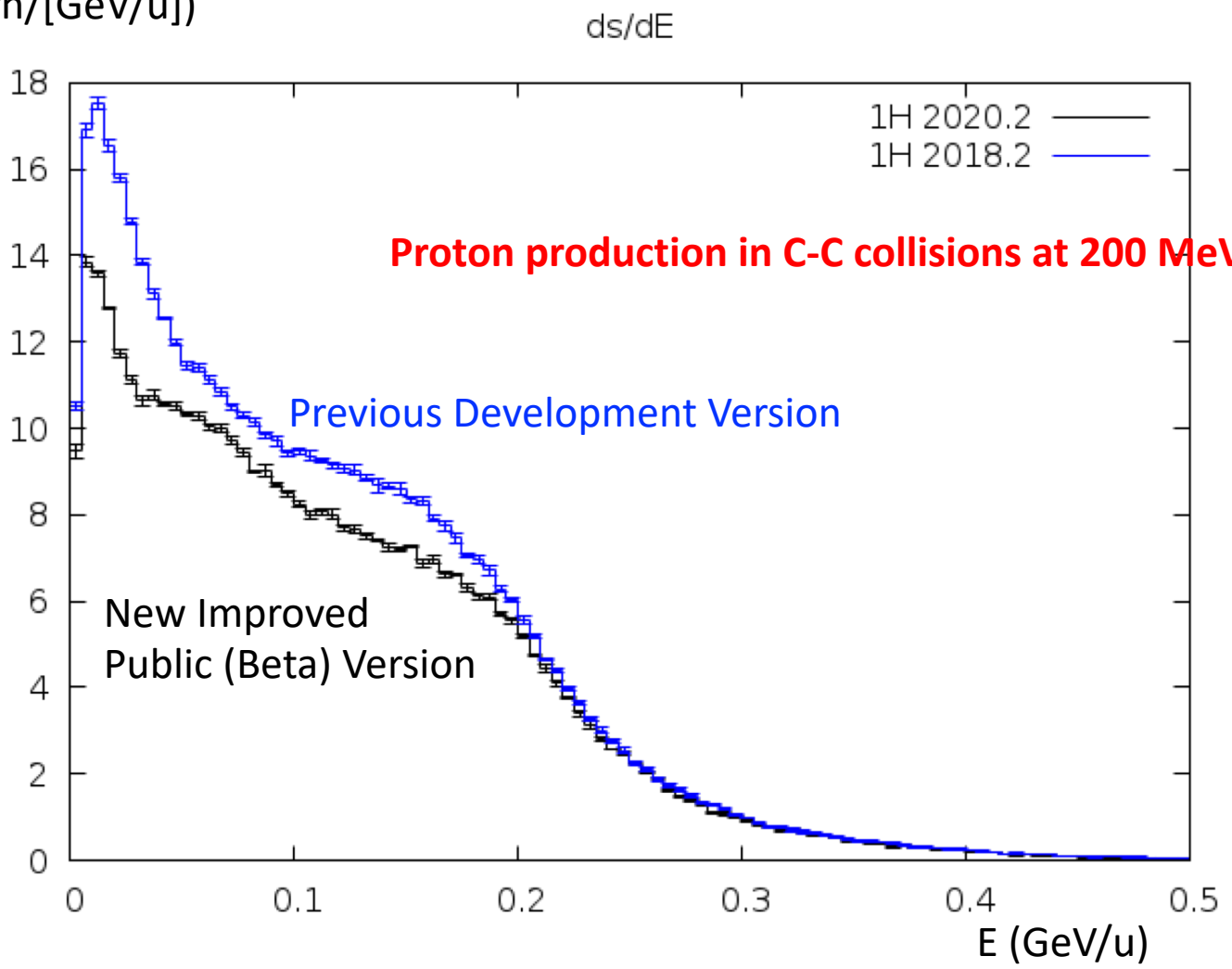
Immediate interest for the analysis of Emulsion Data.

A. Pastore has started testing the new release for ECC simulation (previously the public version 2011.2x was used, which was less reliable than the dev. Version used to produce the official root-ples of electronic apparatus

- **Extended nd improved nuclear database.** Masses, decay channels and branching ratios have been extended n extensively revised. Many more isomers are now included in the database
- A **deuteron pre-formation production mechanism** by light nuclei has been implemented, resulting in much better predictions of excitation functions of reactions like (p,d)/(p,pn), (n,d)/(n,np) on light nuclei at low and intermediate energies.
- Full account for discrete levels, out of the (IAEA) Ripl-3 library, is now implemented in every nuclear reaction step/generator
- **Heavy fragment evaporation up to Z_max=4, A_max=9, is now automatically activated** when the PRECISIOn default is selected
- A simplified model for angular momentum barriers is now implemented inside the Fermi break-up de-excitation model
- Low Energy Neutron cross sections for several isotopes had been updated with more recent evaluations, mostly Endf/b-VIIIr0.
- **A preequilibrium step, based on the PEANUT one, has been introduced in the rQMD event generator. Together with other improvements this results in significantly better reproduction of ion-ion experimental data (E>125 MeV/u)**
- **A preequilibrium step, based on the PEANUT one, has been introduced in the BME event generator (E<125 MeV/u).**
- **Alpha-Nucleus cross sections for light nuclei have been updated according to the recent expreimental data, bringing better agreement with measured attenuation curves and Bragg peaks**

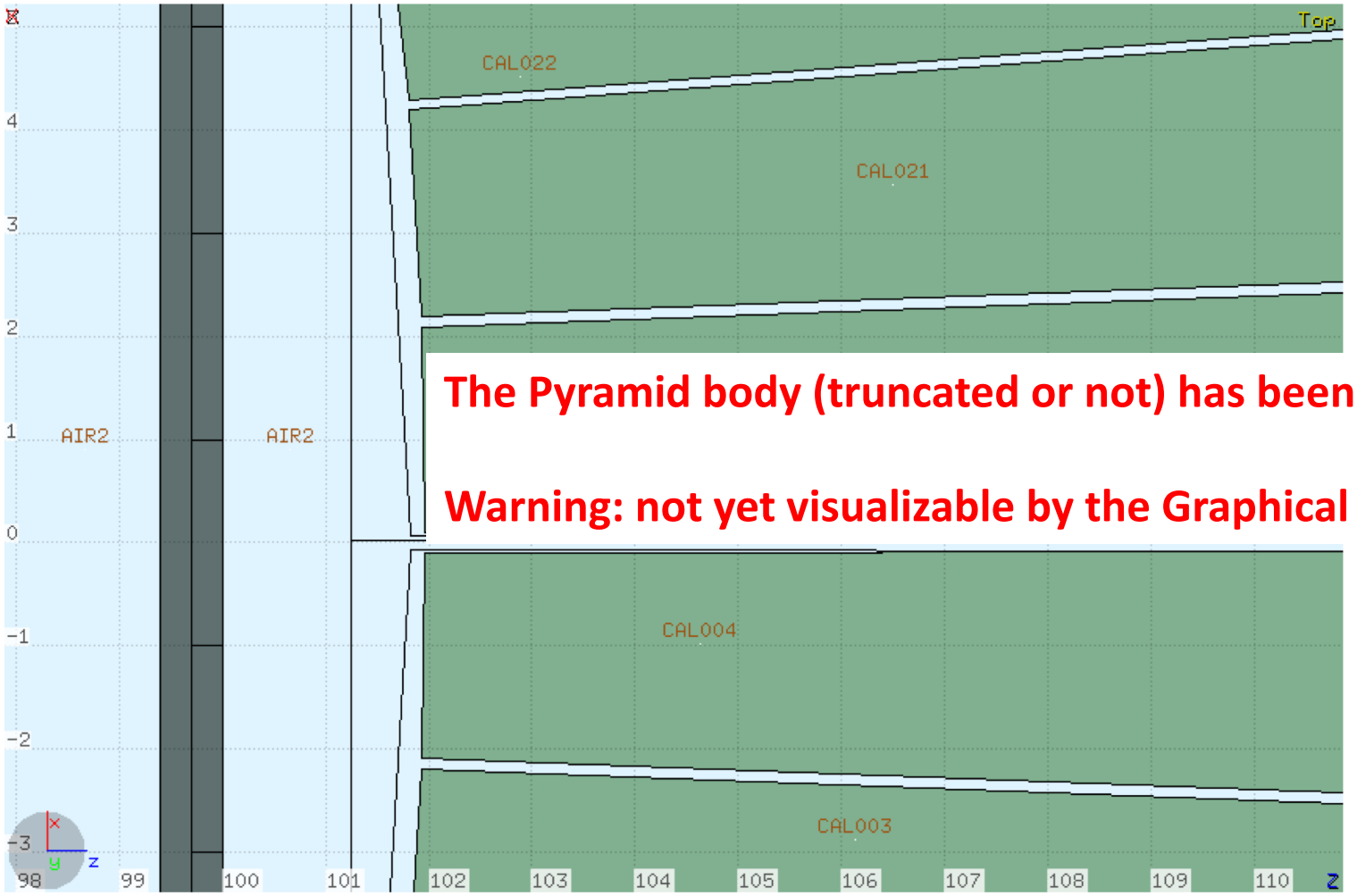
New public FLUKA (beta) version 2020.0

dσ/dE (barn/[GeV/u])



If considered useful GSI (or other) simulations can be produced with the new version

Pyramid body



The Pyramid body (truncated or not) has been introduced

Warning: not yet visualizable by the Graphical User Interface

Full Detector production

/gpfs_data/local/foot/Simulation/newgeom_v1.0

Target 3 mm C with density 1.83 g/cm^3 as that of GSI run

10^7 primaries)

12C_C_200_1.root (^{12}C at 200 MeV/u on C)

16O_C_200_1.root (^{16}O at 200 MeV/u on C)