

***FOOT Performance Meeting***  
***8 May 2018***

# **Introduction**

G. Battistoni, S.M. Valle



Istituto Nazionale di Fisica Nucleare

## After last meeting:

- ▶ We have the professional magnetic map for both 7 and 10 cm long magnets
- ▶ New management of FLUKA Simulation geometry integrated with the Reconstruction Software (SHOE)
- ▶ Some work to study neutron detection in FOOT, or FOOT-like, apparatus has been carried on (not reported today)
- ▶ A meeting on FOOT Mechanical integration has been held last week. In the discussion some questions were raised involving simulation and reconstruction. Some discussion is needed today
- ▶ The BGO crystals are now becoming available. A new geometry of the calo has to be considered

# Meeting of FOOT Mechanics (3 May, Pisa)

<https://agenda.infn.it/conferenceDisplay.py?confId=15695>

## FOOT meeting meccanica

chaired by Maria Giuseppina Bisogni (PI)

Thursday, 3 May 2018 from **11:00** to **18:00** (Europe/Rome)  
at **INFN Pisa ( aula 250 )**

**Description** meeting tecnico dedicato alla meccanica di FOOT

### Thursday, 3 May 2018

- |               |  |
|---------------|--|
| 11:00 - 11:30 | FOOT 30'   |
|               | Speaker: Vincenzo Patera (ROMA1)   |
|               | Material: <a href="#">Slides</a>   |
| 11:30 - 13:00 | FOOT detectors 1h30' <span style="float: right;">▼</span>  |
|               | Speakers: Maria Giuseppina Bisogni (PI), Giuseppe Battistoni (MI), Piergiorgio Cerello (TO), Giovanni De Lellis (NA), MATTEO MORROCCHI (PI), Eleuterio Spiriti (LNF), Roberto Spighi (BO), Adalberto Sciubba (ROMA1), Dr. Leonello Servoli (PG), Dr. Francesco Tommasino (TIFP), Giuseppe Giraudo (TO), Ms. Sofia Colombi (EBG MedAustron) |
|               | Material: <a href="#">Slides</a>      |
| 13:00 - 14:00 | lunch break  |
| 14:00 - 16:30 | Discussione e programmazione 2h30'   |

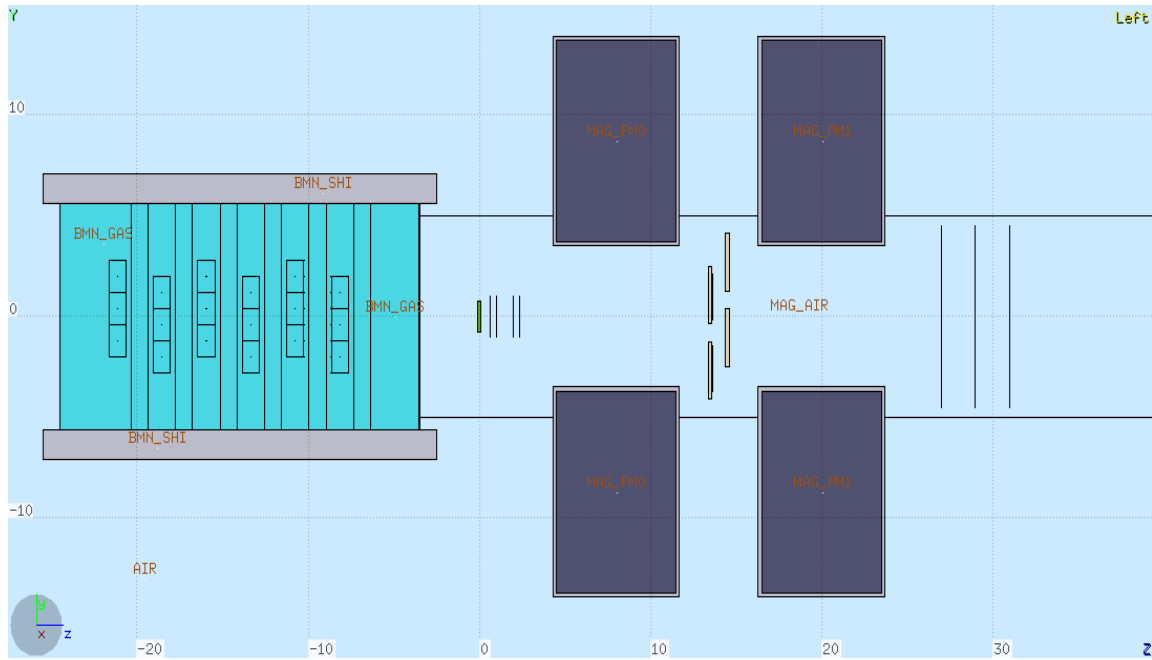
## Some relevant issues for today (and this series of meetings)

- ▶ A new Start Counter design (from “Margherita” to “Margarita”)
- ▶ General consensus about the 10 cm long magnet solution
- ▶ What is the impact of uncertainties in the knowledge of magnetic map?
- ▶ Magnetic deflection and alignment of detector: risk of losing some acceptance. Should we consider the 2 magnets with the same orientation of B-field or should we consider to have two opposite orientations?

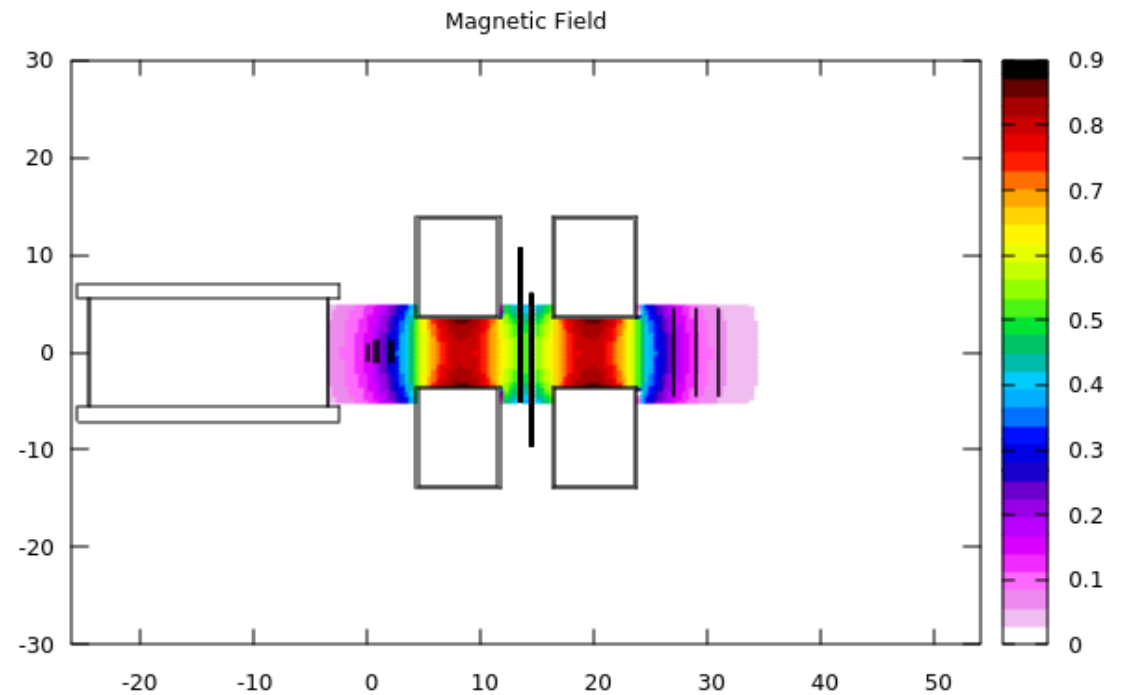
# Simulation Update: V14

- ▶ Fully handled by the SHOE software:
- ▶ - in /Simulation/foot\_geo.h → constants, positions, distances, etc
- ▶ - in /libs/src/TADETbase/TADETparGeo.cxx and .h → methods to write geometry for each detector (both root and FLUKA geo)
- ▶ - /Simulation/MakeGeo.cxx → main code that produces FLUKA geo (recalls methods described in the libraries)
- ▶ In this way the reconstruction software is ready to reconstruct the events with the same geo used to produce simulations

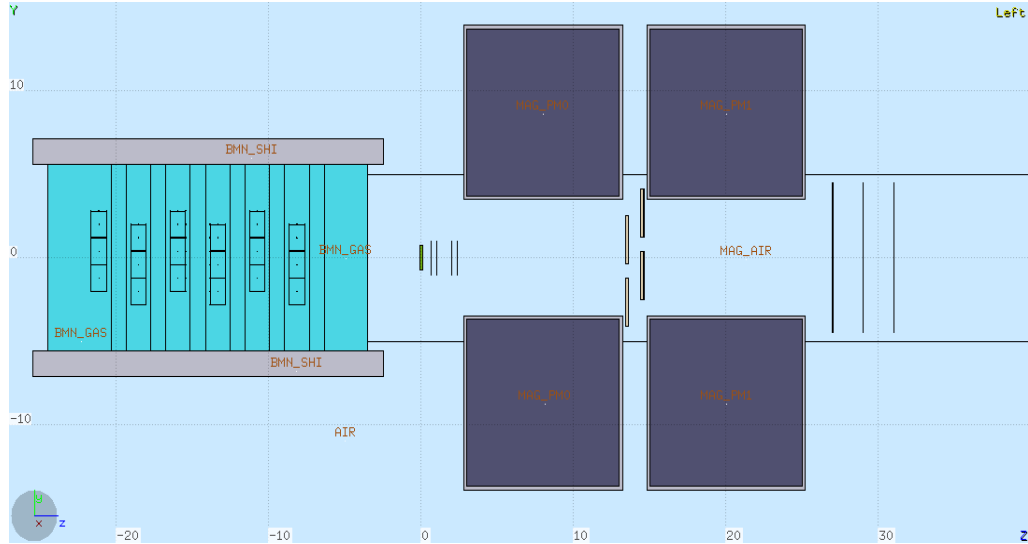
## V14.0



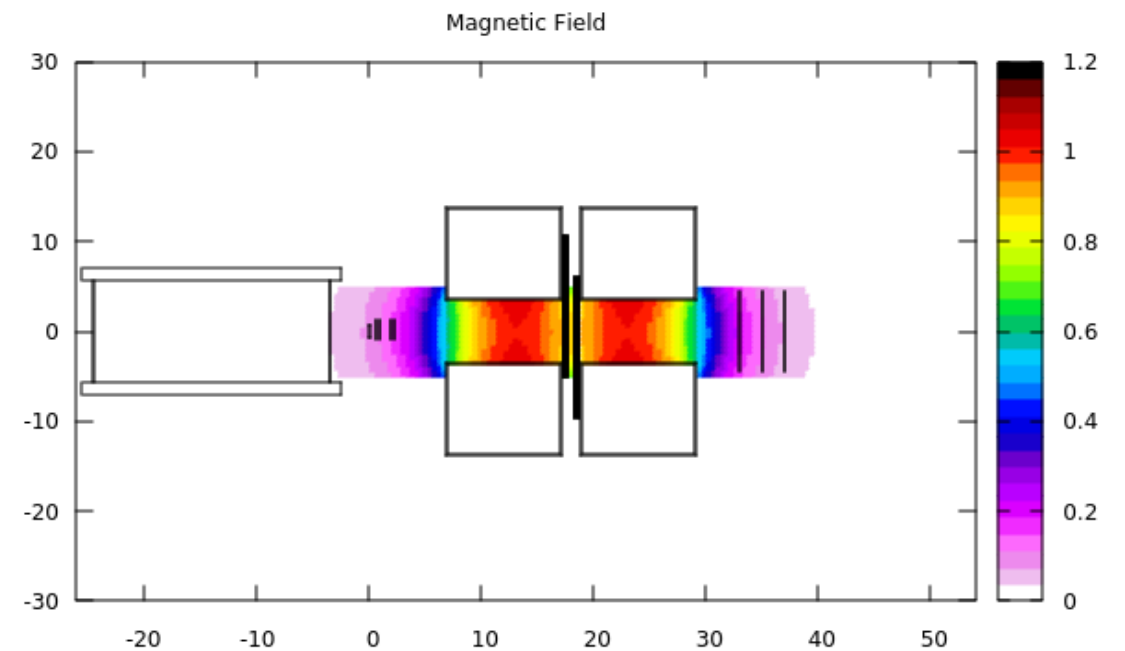
- magnets length 7 cm
- magnet distance (center-center) 12 cm



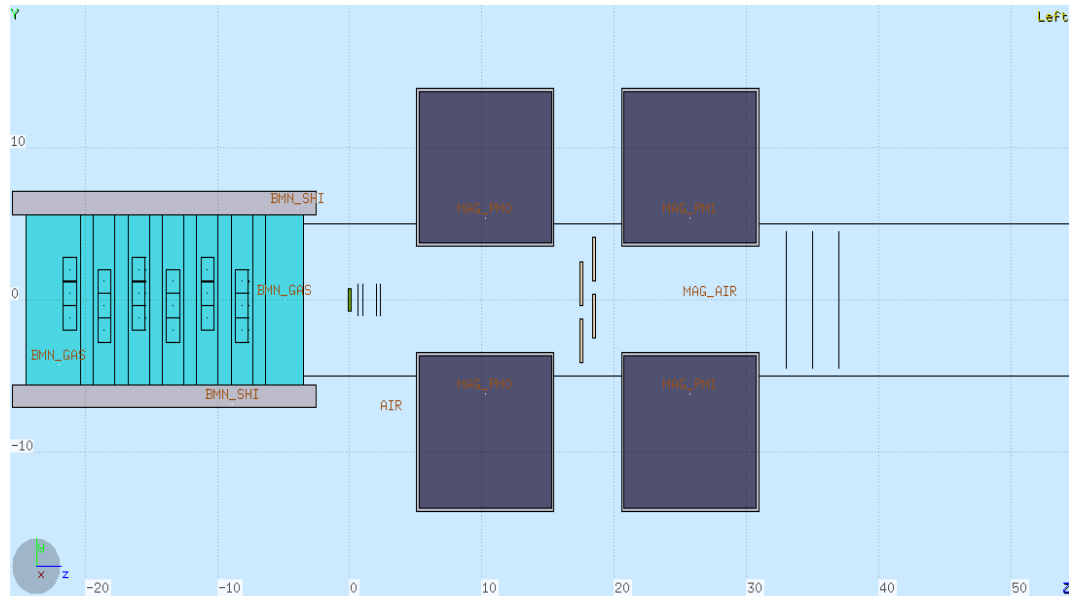
## V14.1



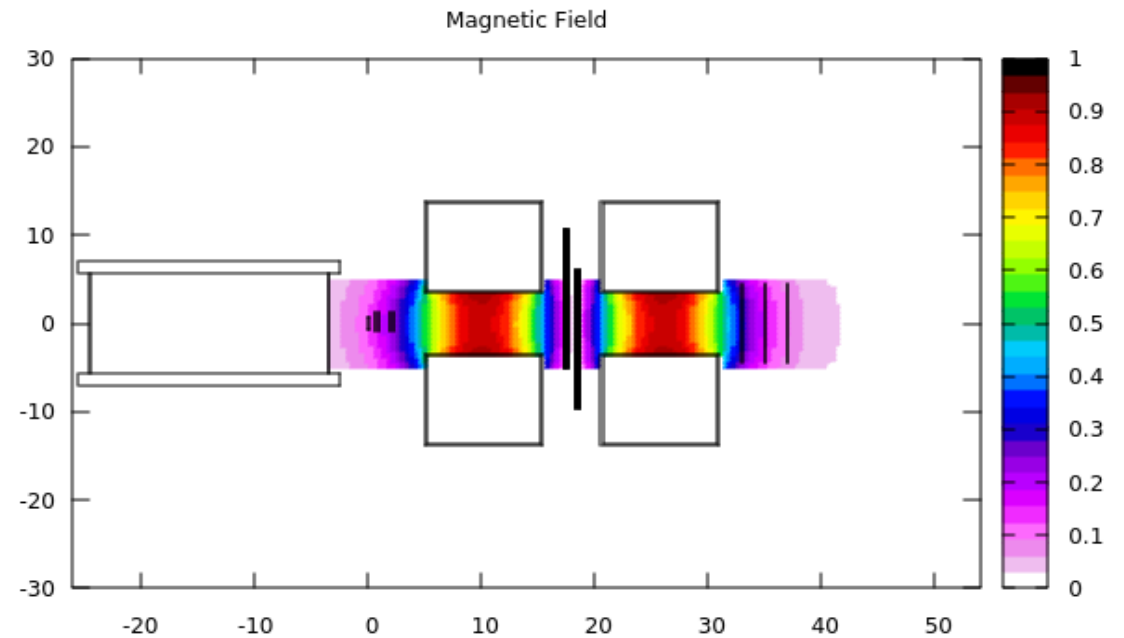
- magnets length 10 cm
- magnet distance (center-center) 12 cm (gap btw ~2cm)



## V14.2

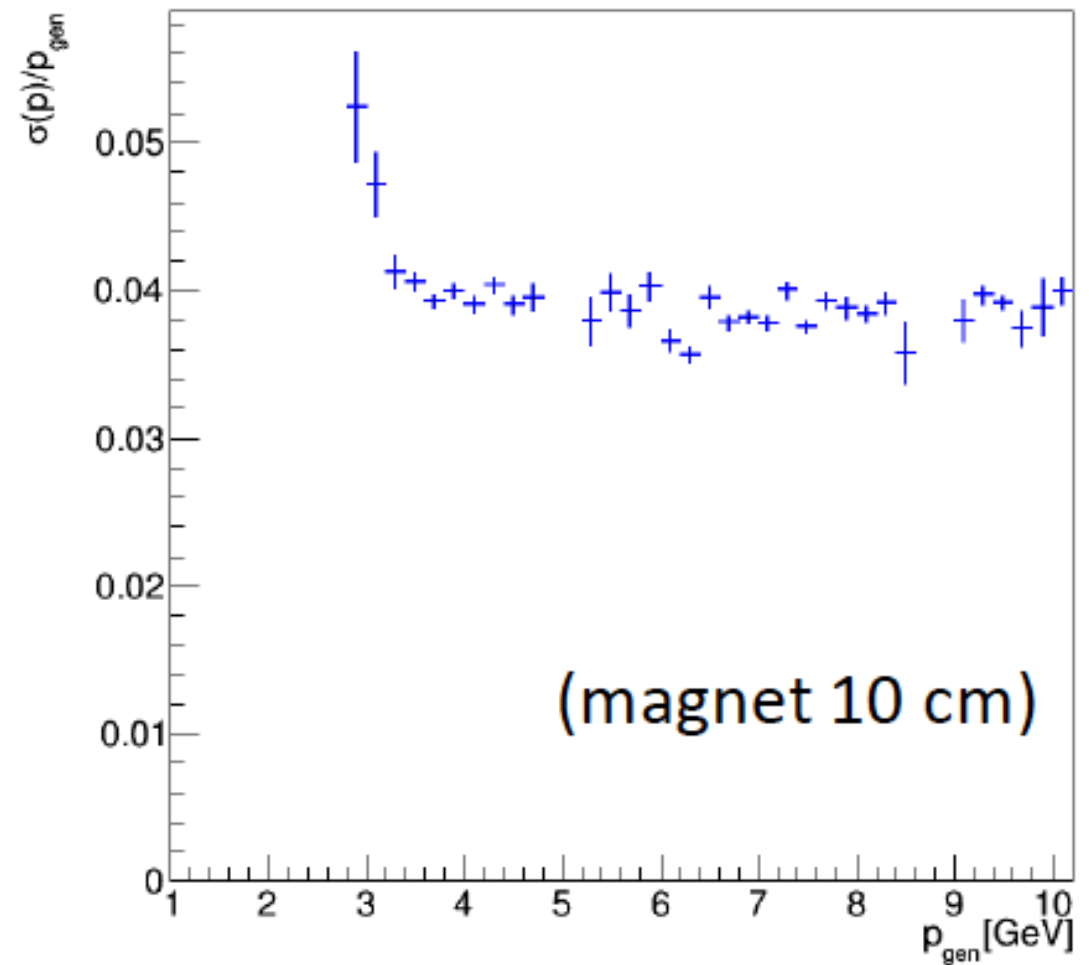
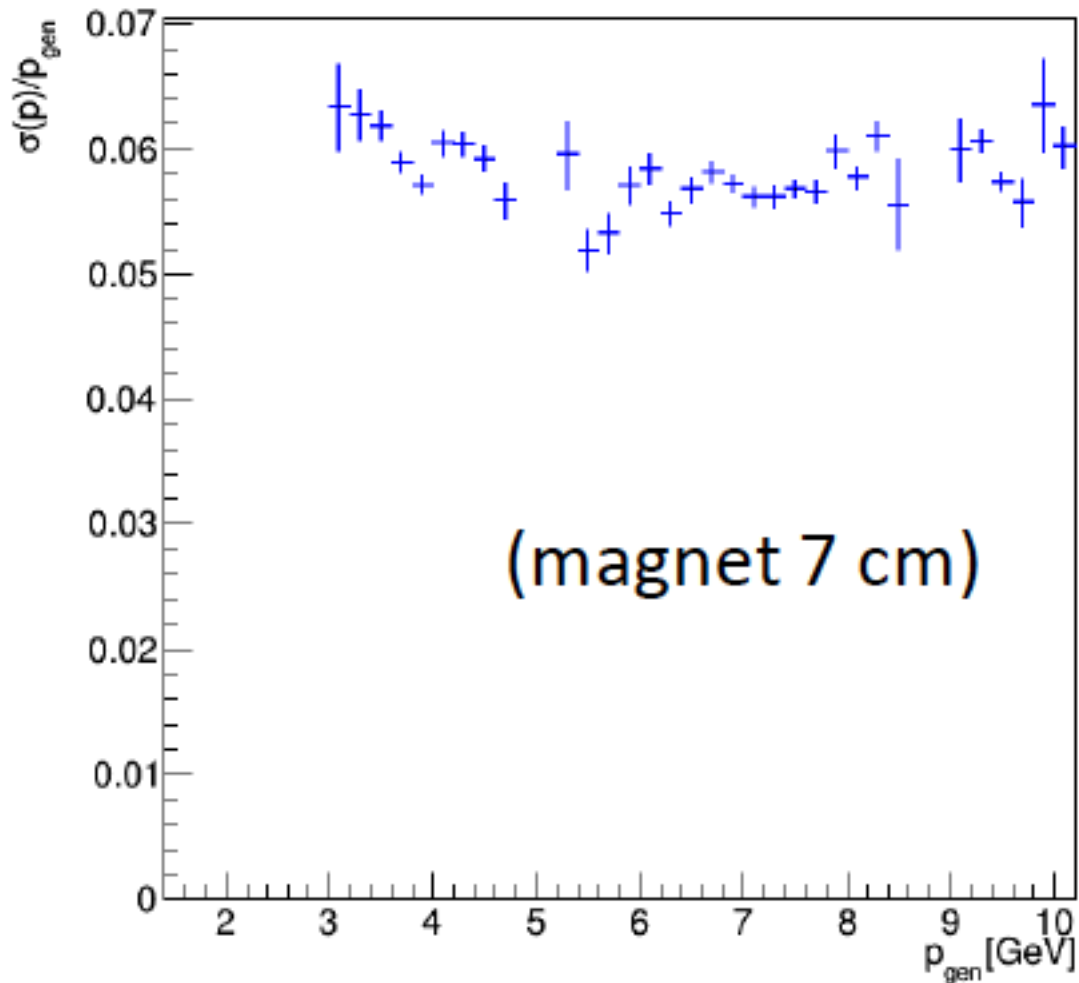


- magnets length 10 cm
- magnet distance (center-center) 12 cm (gap btw ~5cm)
- plume and msd shifted downstream



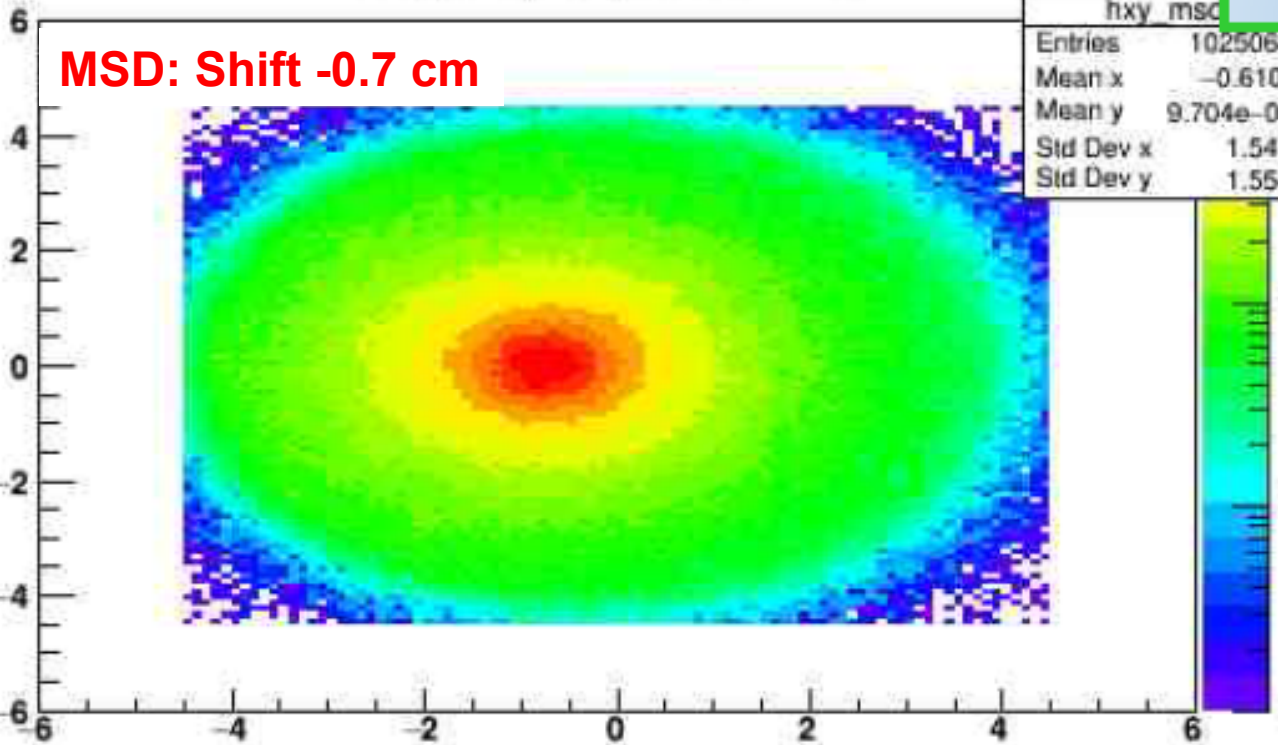


# Improvement in p resolution with 10 cm magnet (*M. Franchini*)

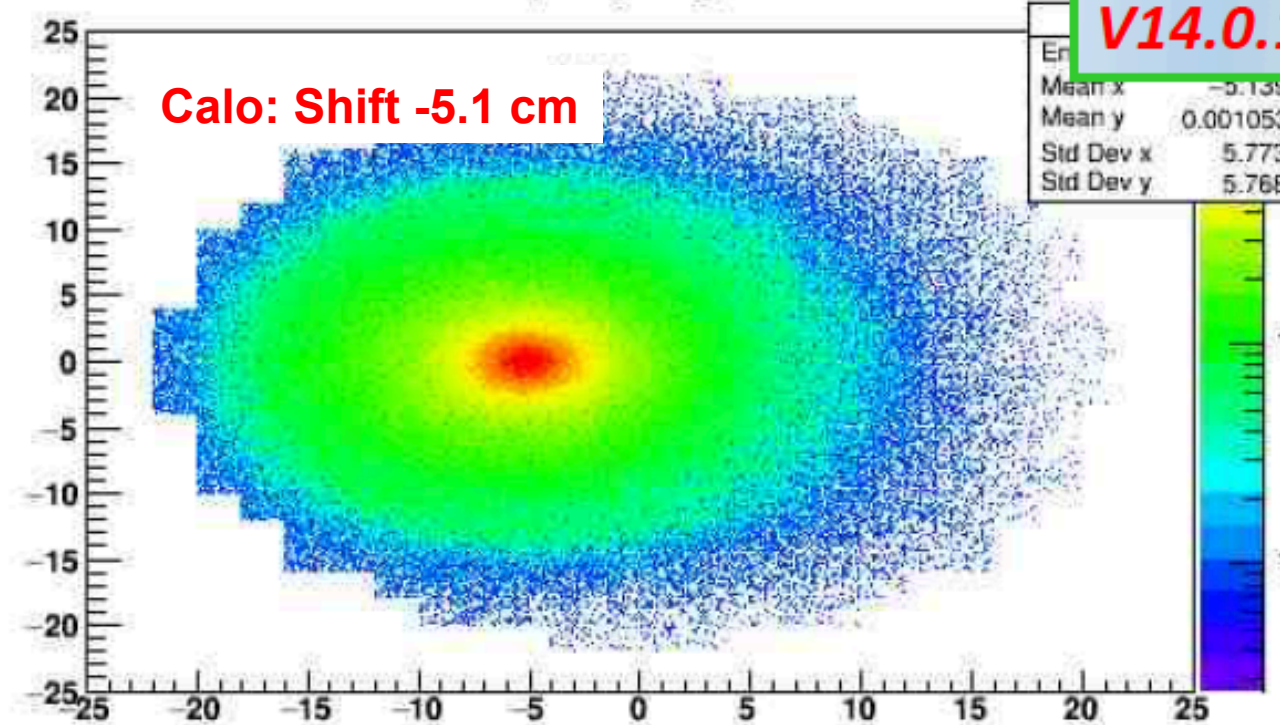


# Deflection in the case of 2 magnets aligned: possible loss of efficiency (*thanks to R. Spighi*)

occupancy long tracks in MSD

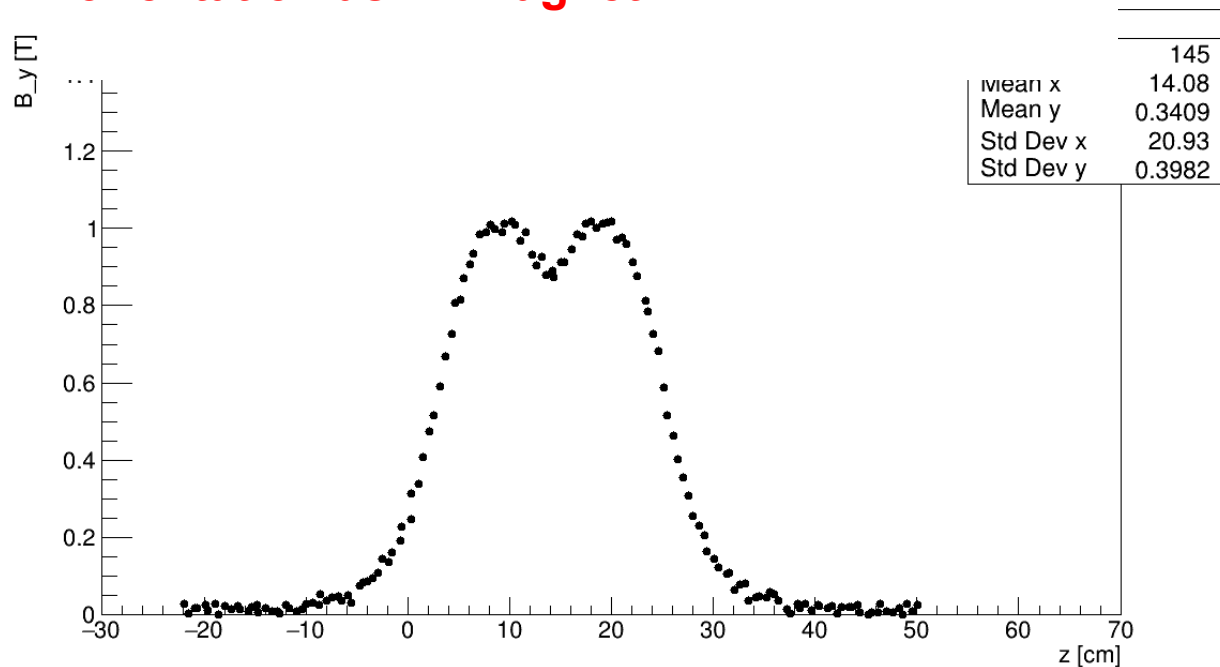
**MSD: Shift -0.7 cm**

occupancy long tracks

**Calo: Shift -5.1 cm****V14.0..**

# V14.2 + V14.2inv

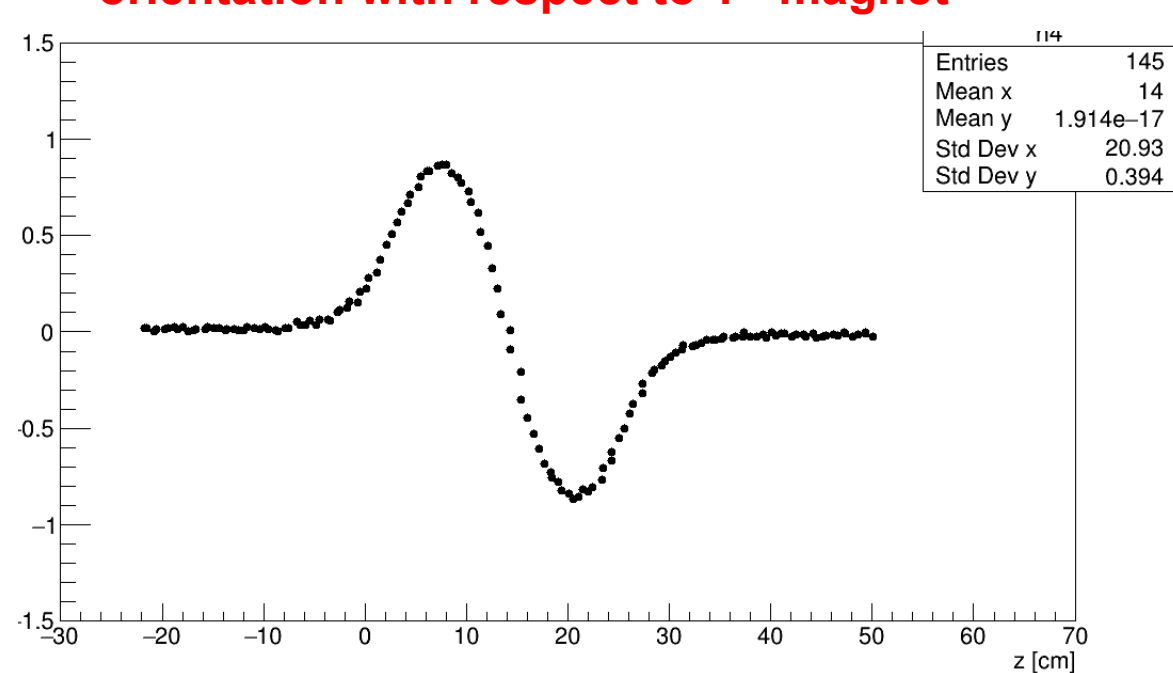
**2<sup>nd</sup> magnet with same magnetic field orientation as 1<sup>st</sup> magnet**



**On TIER3:**

**/gpfs\_data/local/foot/Simulation/V14.2  
16O\_C2H4\_200\_1.root (10<sup>7</sup> primaries)**

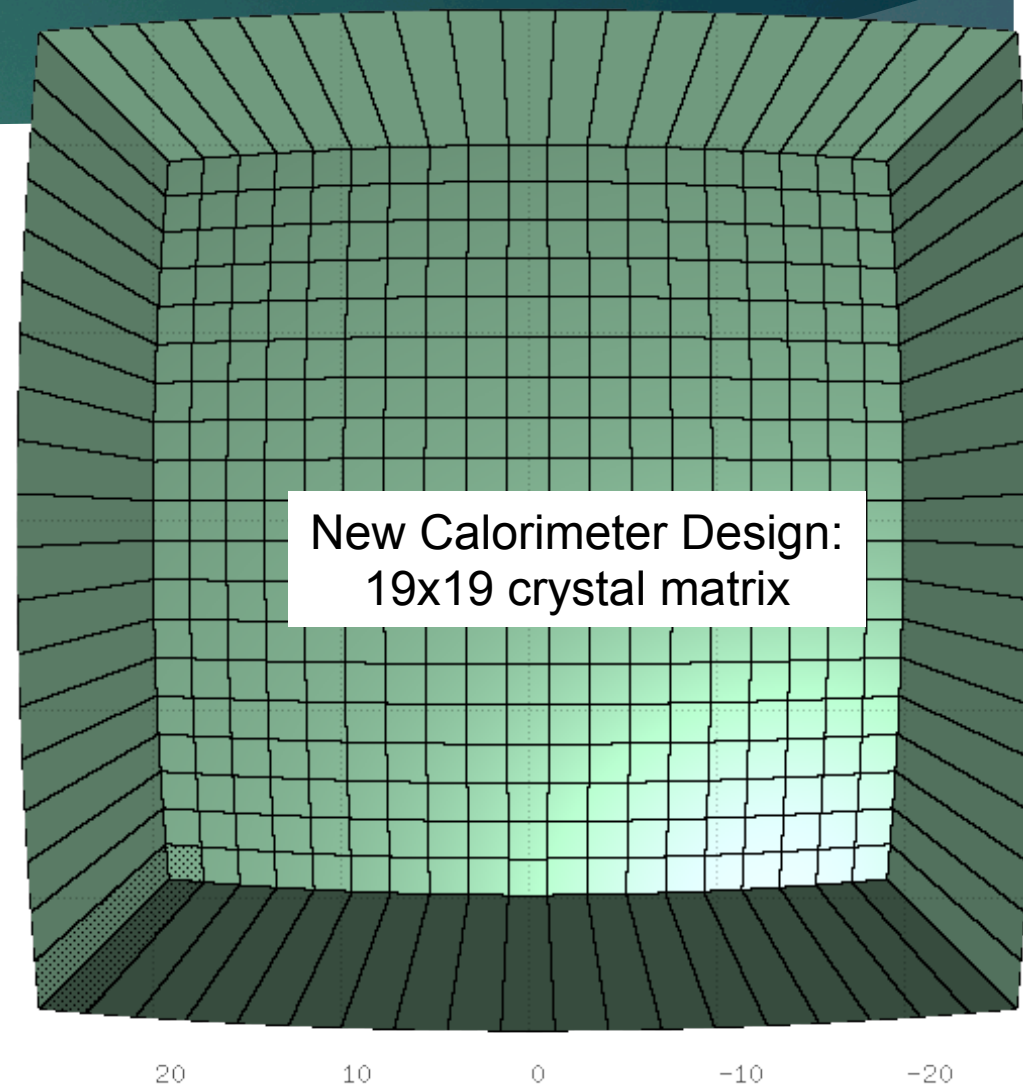
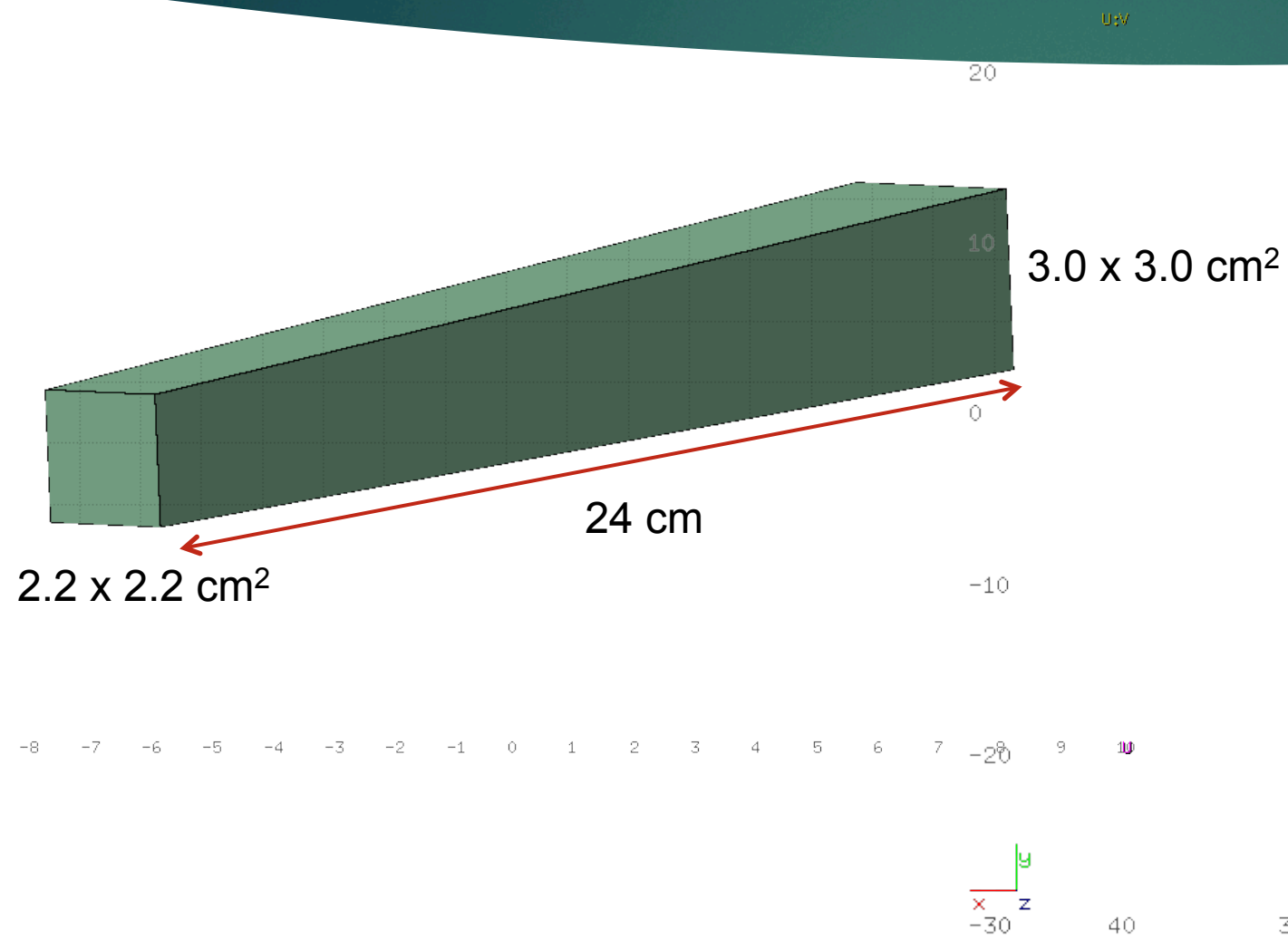
**2<sup>nd</sup> magnet with opposite magnetic field orientation with respect to 1<sup>st</sup> magnet**



**On TIER3:**

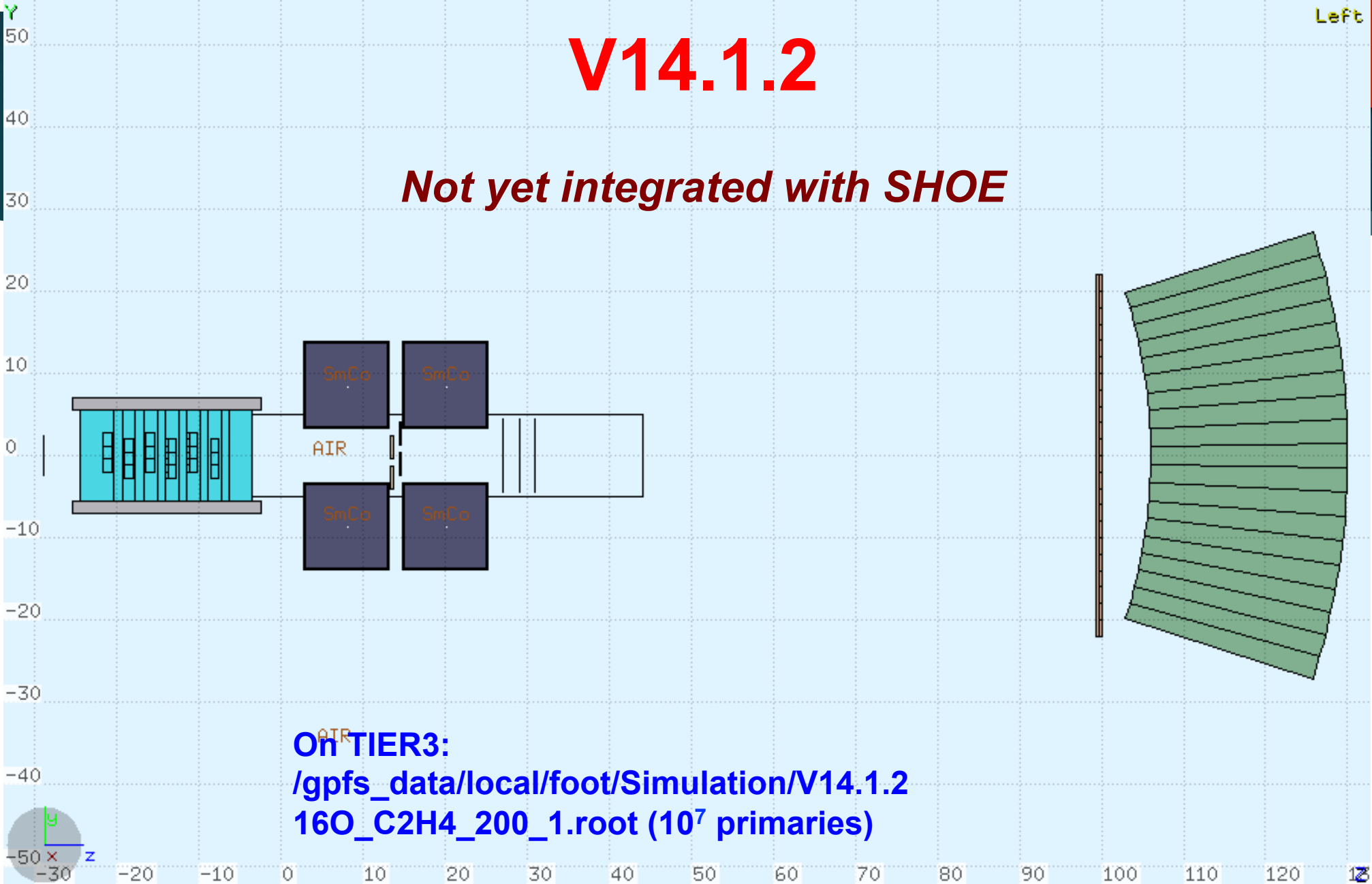
**/gpfs\_data/local/foot/Simulation/V14.2inv  
16O\_C2H4\_200\_1.root (10<sup>7</sup> primaries)**

# New BGO Crystals (truncated pyramid)



# V14.1.2

*Not yet integrated with SHOE*



On TIER3:  
/gdfs\_data/local/foot/Simulation/V14.1.2  
160\_C2H4\_200\_1.root (10<sup>7</sup> primaries)

# FOOT Simulation Tutorial

**Proposal for a new tutorial about basic handling of FLUKA simulation of FOOT:**

**2 consecutive days in the period 11-14 June in Milano**

<https://doodle.com/poll/edih3irxm6rg6fmu>

# Test Beam studies

**On May 10, @14:30: Skype Call for the preparation of Beam Monitor calibration test in 2018**

**Trento PAC approved the request around middle of March:  
15 hours**

## To be started:

- ▶ Evaluate performances with updated geometry **considering uncertainties on magnetic field map**
- ▶ Optimization of relative distances, positioning, etc:
- ▶ Update of resolution estimates
- ▶ Update CDR Results
- ▶ Paper production
- ▶ Work for test beams
- ▶ Studying new physics possibilities:



# Analysis of FOOT Performances Skype Meeting

Tuesday, 8 May 2018 from 09:30 to 13:30 (Europe/Rome)

Manage ▾

## Today's agenda

**Description** <https://vidyoportal.cern.ch/join/8Ri73v1Don>

### Tuesday, 8 May 2018

- |               |  |   |
|---------------|--|---|
| 09:30 - 09:55 | Introduction, Simulation Updates, Next deadlines, Work Organization 25'<br>Speakers: Giuseppe Battistoni (MI), Serena Marta Valle (MI) | ▾ |
| 09:55 - 10:10 | Updates on track reconstruction 15'<br>Speaker: Matteo Franchini (BO)  | ▾ |
| 10:10 - 10:25 | Reconstruction Software Update & Multitracking Preliminary Study 15'<br>Speaker: Alberto Mengarelli (BO)                               | ▾ |
| 10:25 - 10:45 | Preliminary test beam results of the Aachen calorimeter 20'<br>Speaker: Dr. Ronja Hetzel (RWTH Aachen)                                 | ▾ |
| 10:45 - 11:05 | Trento Test Beam results 20'<br>Speaker: Dr. Leonello Servoli (PG)   | ▾ |
| 11:05 - 11:25 | TOF-dE/dx results with 40-cm scintillator bars irradiated with Protons and Carbon ions 20'<br>Speaker: MATTEO MORROCCHI (PI)           | ▾ |
| 11:25 - 11:50 | Update on simulations for scintillator bars 25'<br>Speaker: Aafke Christine Kraan (PI)   | ▾ |
| 11:50 - 12:05 | ECC status 15'<br>Speaker: Adele Lauria (NA)   | ▾ |
| 12:05 - 12:15 | Beam Monitor Status 10'<br>Speaker: Yunsheng Dong (MI)   | ▾ |
| 12:15 - 12:35 | FOOT papers 20'<br>Speaker: Roberto Spighi (BO)  | ▾ |