Update on new simulation of GSI2021 campaign (GSI21PS_MC)

G. Battistoni, S. Muraro

INFN Milano

Present Status:

We have produced GSI21PS_MC, CNAO23PS_MC and GSI25PS_MC (first hypothesis of ^{16}O at 500 MeV/u)

- GSI21PS_MC: 5 Millions of primaries, ^{nat}C target (run 400), C_2H_4 target (run 401) and no target (run 402), 1 sigle file for each run

  Tier1: /storage/gpfs_data/foot/shared/SimulatedData/GSI21PS_MC

Warning: we found a mistake on the beam shape, so we have just rerun the simulation, but files on Tier1 have not yet been replaced at this time

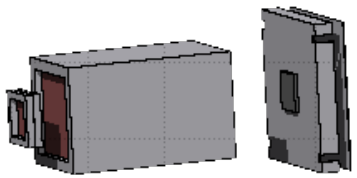
- CNAO23PS_MC: 5 Millions of primaries (run 200) in 5 files

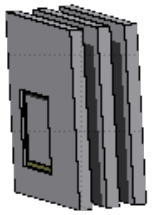
  Tier1: /storage/gpfs_data/foot/shared/SimulatedData/GSI21PS_MC

- GSI25PS_MC: 1 Million of events, preliminary, not yet copied on Tier1

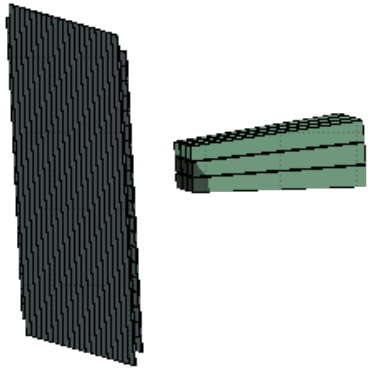
New!

GS21PS_MC:





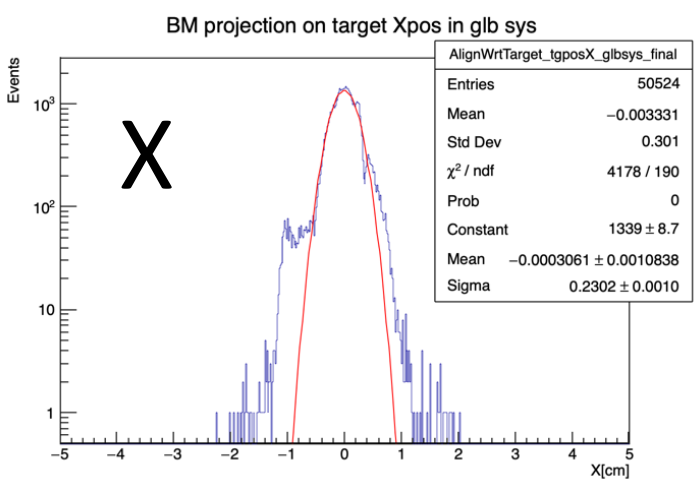
GSI2021 exp data

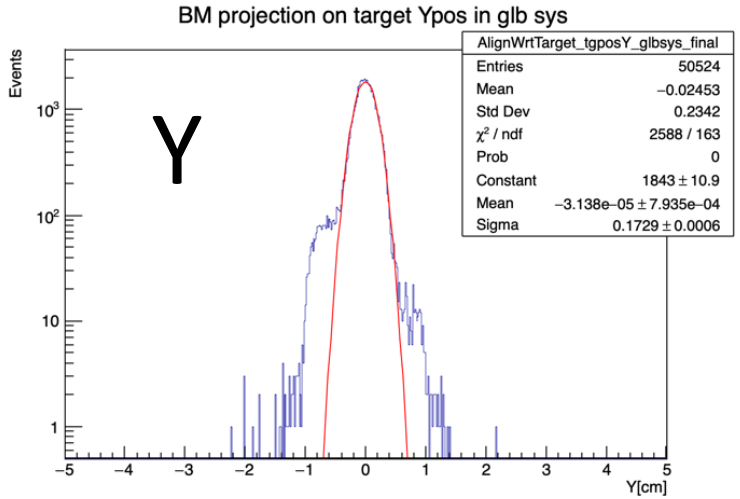


As agreed with the analysis group, looking at exp. data, beam shape has been approximated with 2 independent X-Y gaussians having FWHM of 0.7104 and 0.5527 cm respectively, and slightly off-centered:

<x> = +0.147 cm

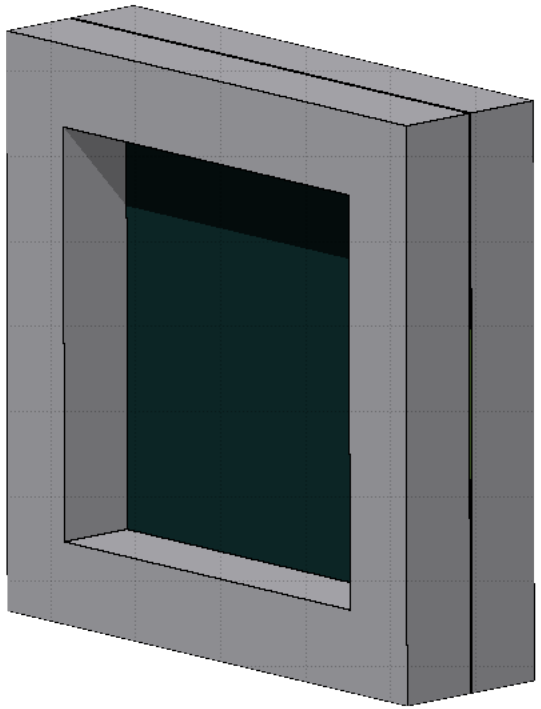
<y> = -0.055 cm

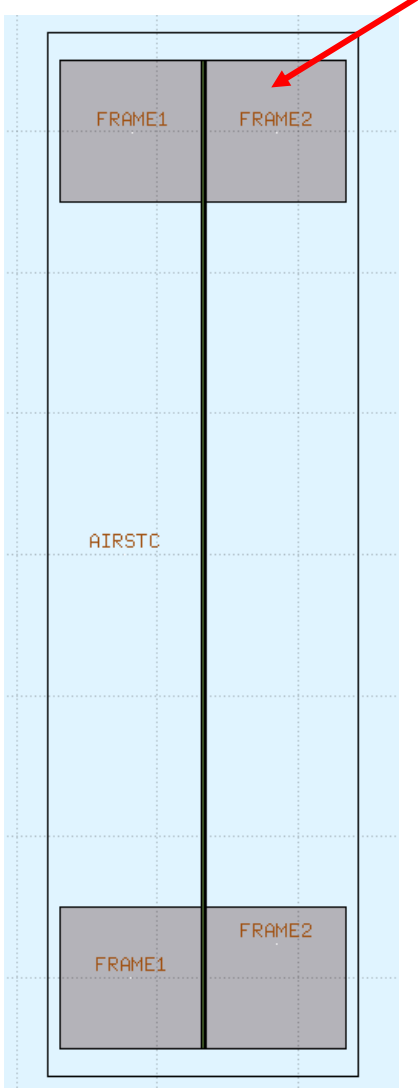




What happens with passive materials?

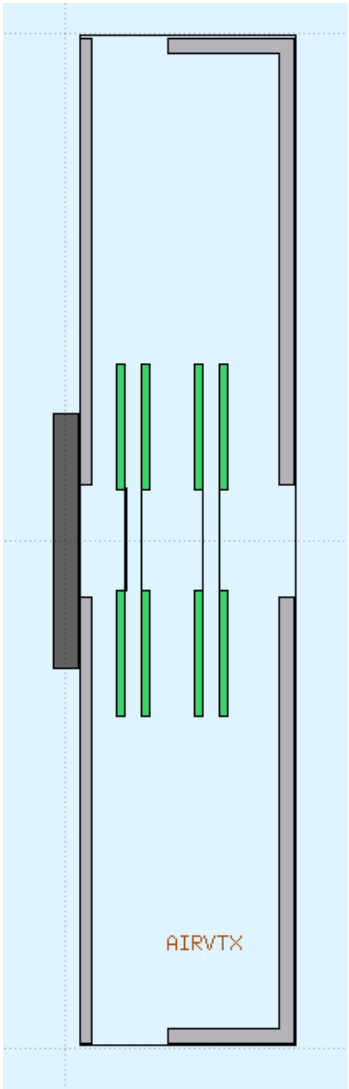
SC





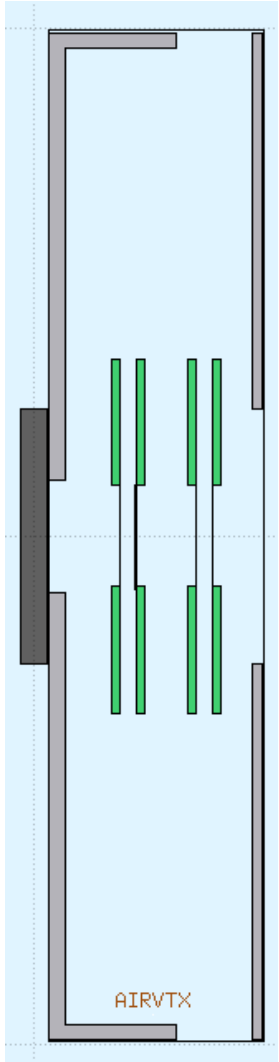
1 cm + 1 cm Al frame

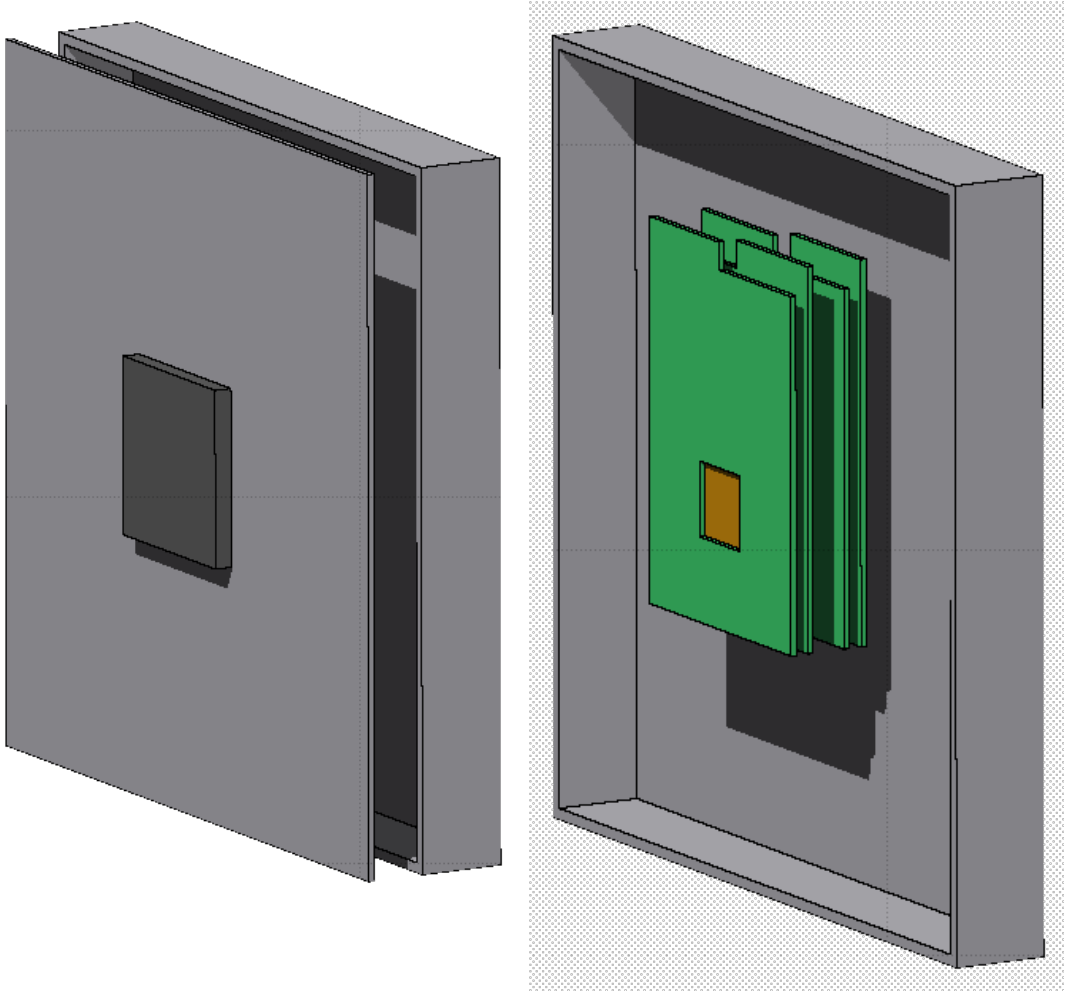
VTX



GS21PS_MC (SupportInfo=1)

CNAO22PS_MC (SupportInfo=2)

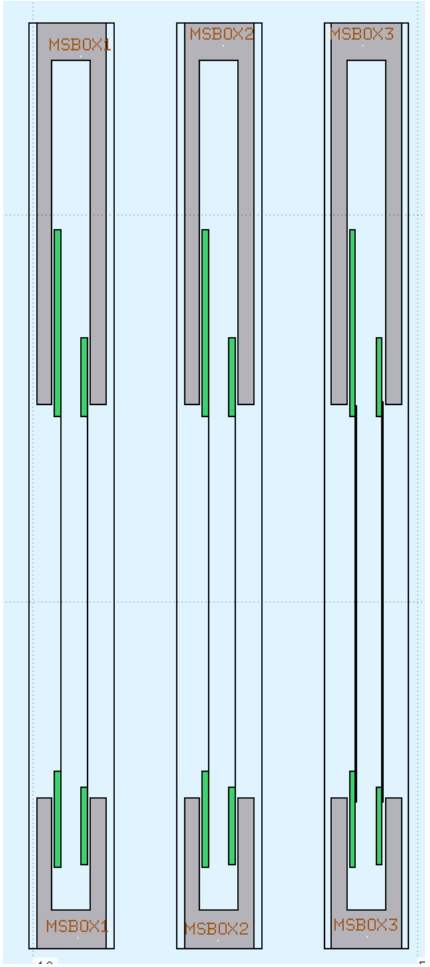


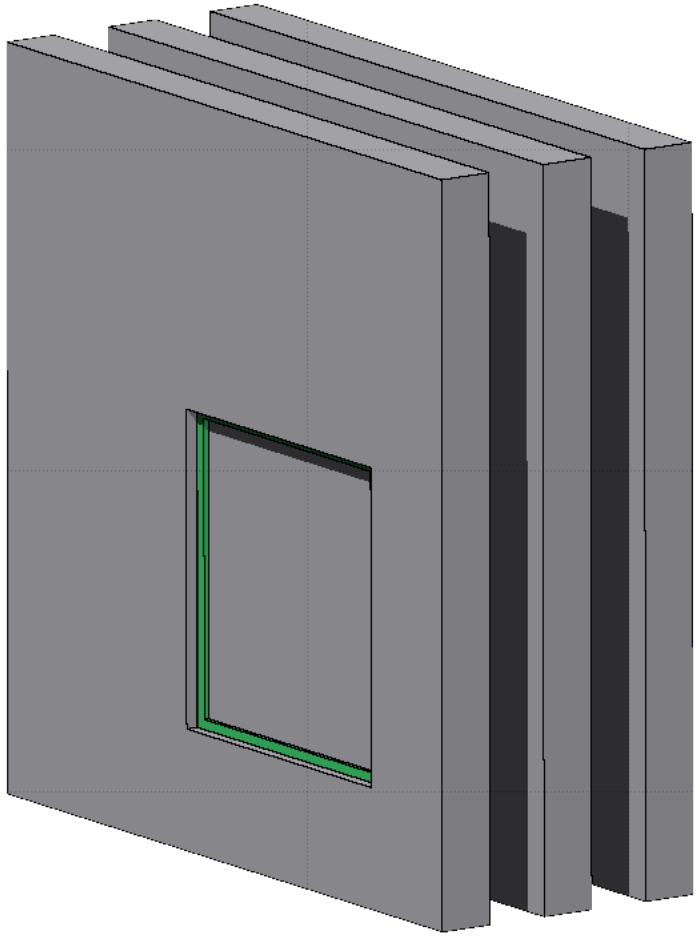


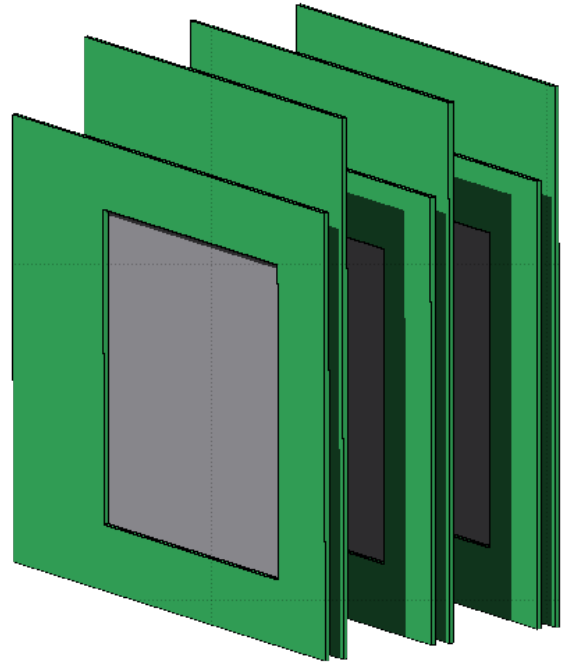
CNAO23PS_MC (SupportInfo=3)

MSD GSI21PS_MC

3 boxes (3 different AIRMSD)

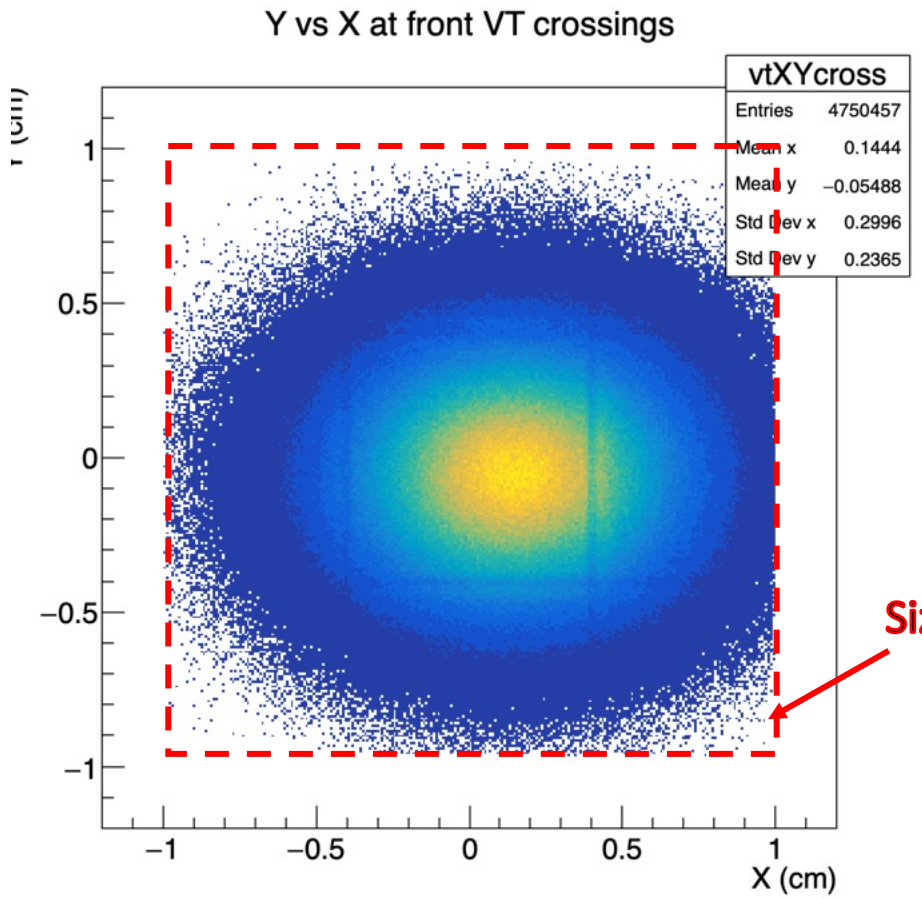


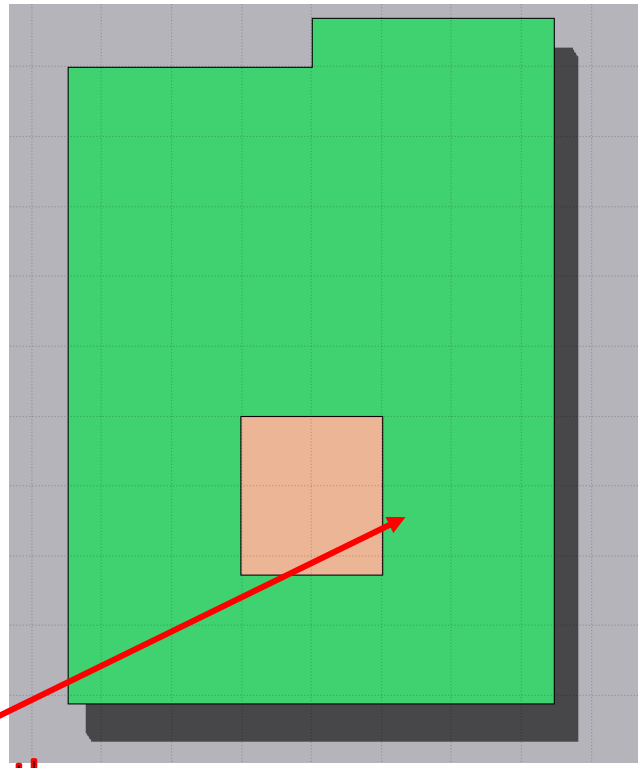




Interaction of primaries in passive materials:

No interactions on the SC frame (beam width is not so large)
The main effects have to be expected by interactions on the VT (although still small)





The number of primary interactions in the VT increases by ~13% (in absolute it remains a small number as compared to interaction in air)

Some numbers

Interaction of primaries: (^{16}O 400 MeV/u on graphite target)

Total no. of Processed Events: 5000000

No. of interactions in Air: 64761 Before TG: 20408 After TW: 44353

No. of interactions in STC: 8352 (STC passive mat: 0)

No. of interactions in BMN: 7057 (shield: 3; mylar wind.: 1709; sense wires: 33; field wires: 624; gas: 4688)

No. of interactions in TGT: 200458 (~4%)

No. of interactions in VTX: 7267 (VTX passive mat: 791)

No. of interactions in MSD: 29407 (MSD passive mat: 25)

No. of interactions in TW : 169690

SHOE Reconstruction

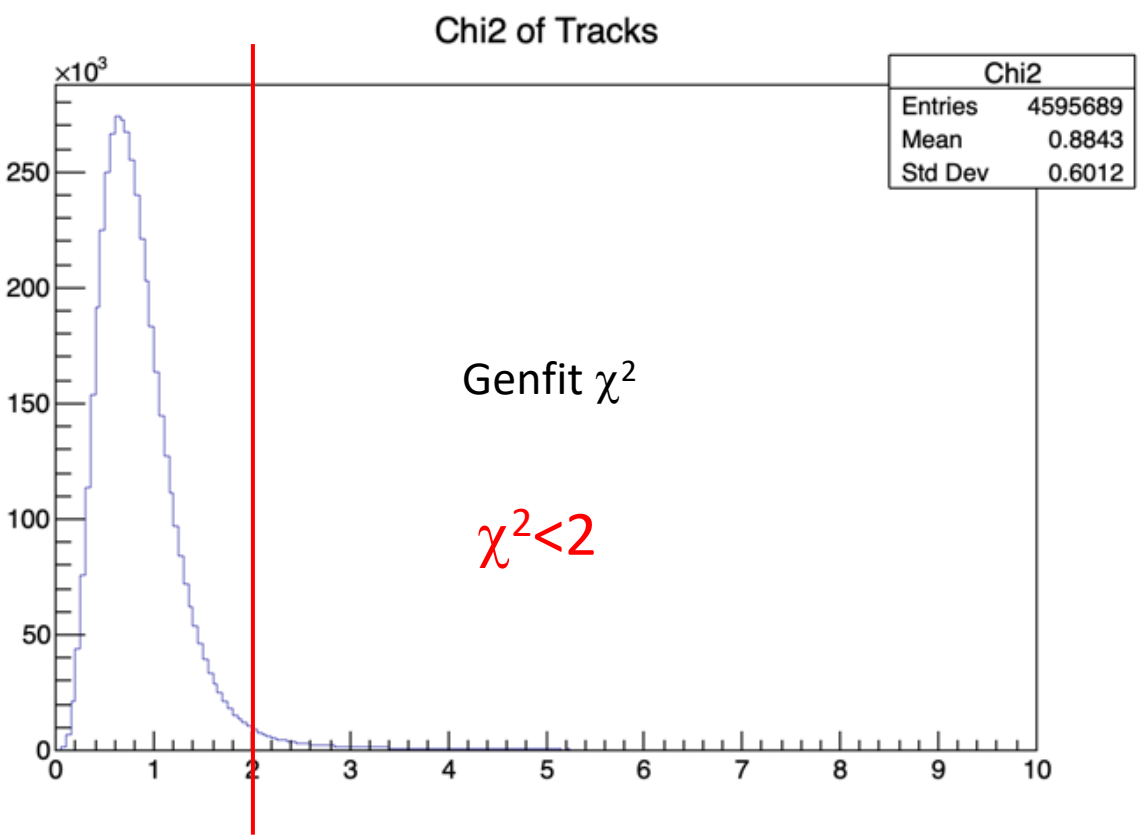
4 370 174 rec. Global Tracks/5 millions of primaries

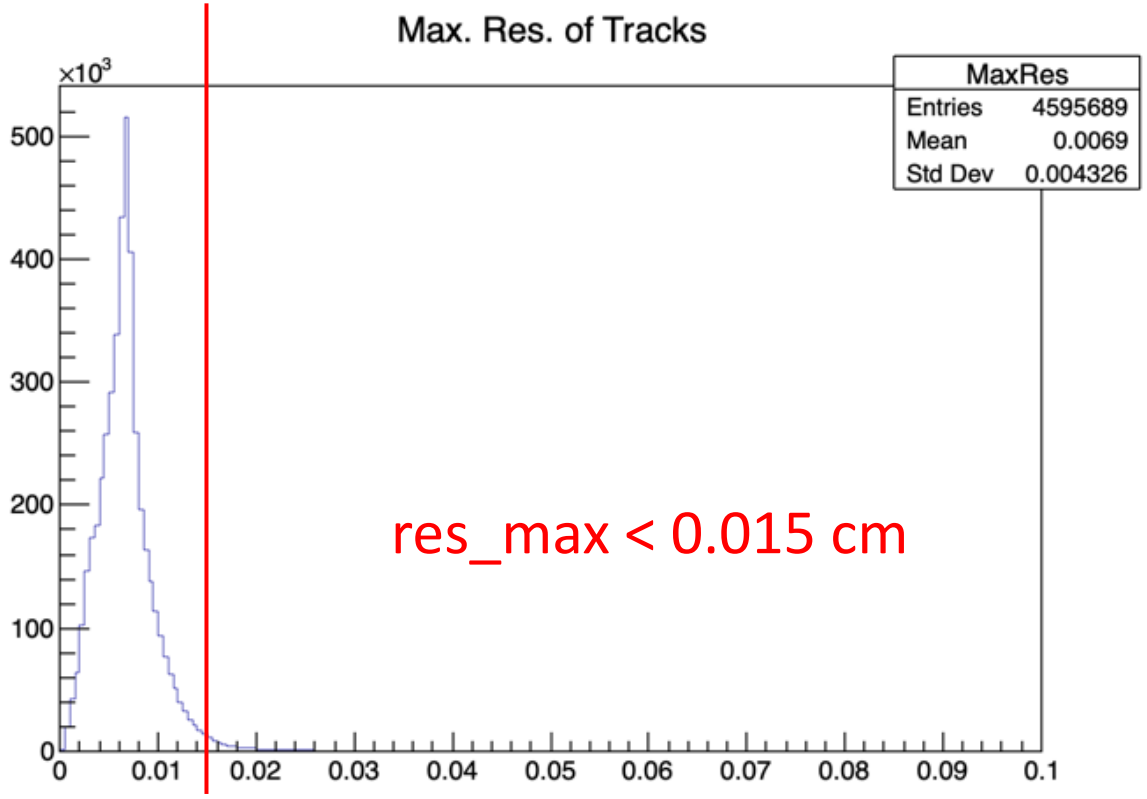
Tentative list of selection cut criteria:

χ^2
Max residual (fit-measured) in a track
Tof< Tof(50 MeV/u)
1 Beam Monitor track reconstructed

SHOE Reconstruction

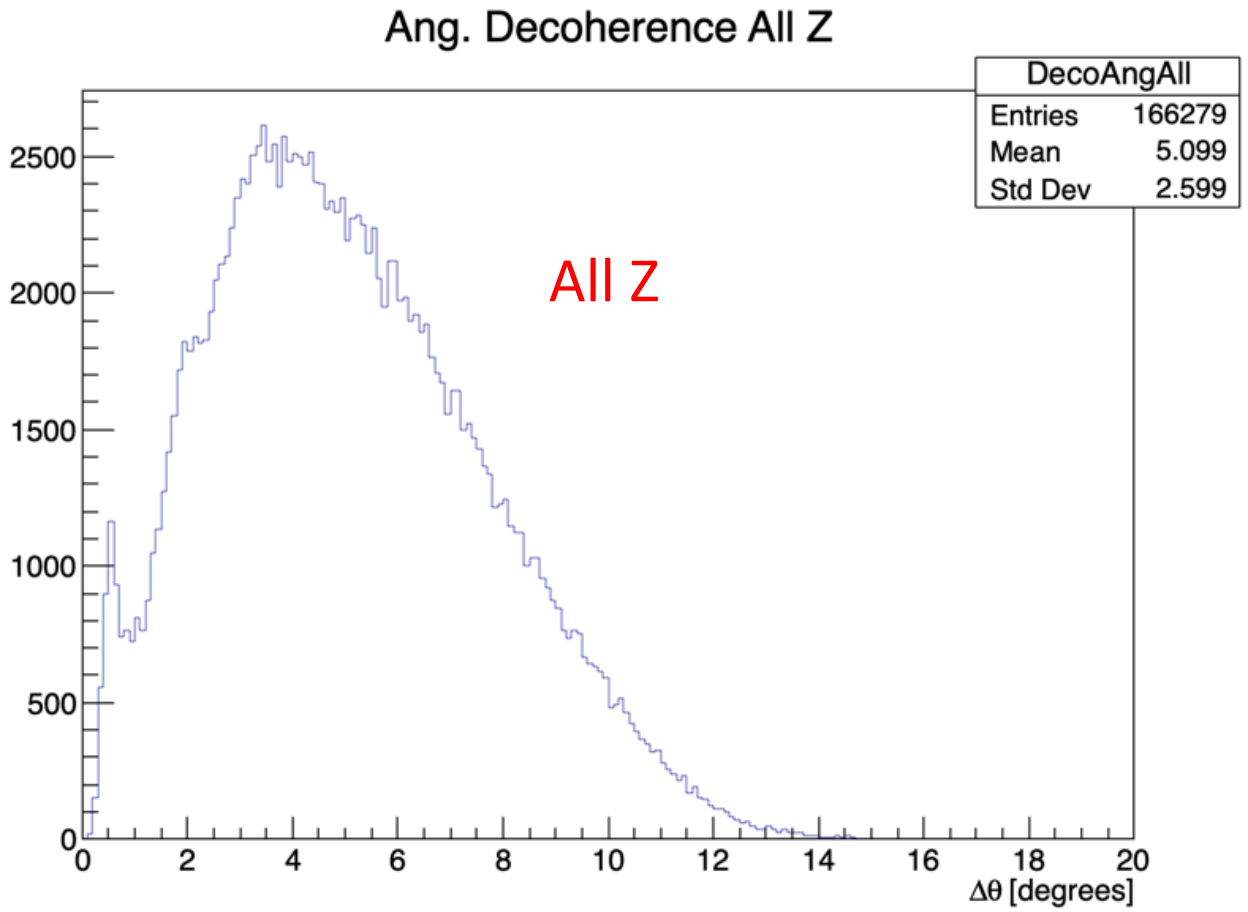
Preliminary





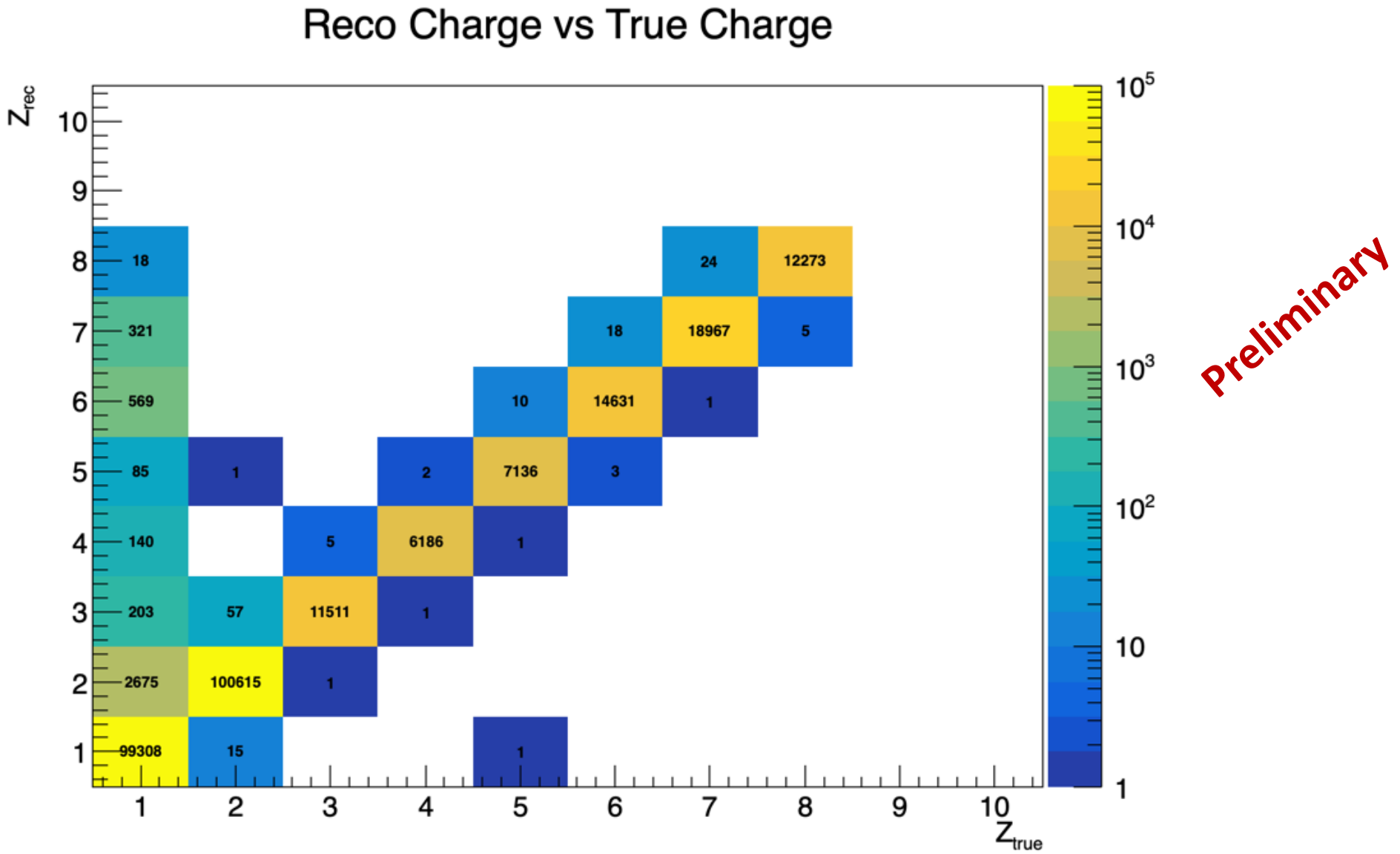
4235092 selected rec. Global Tracks/5 millions of primaries

SHOE Reconstruction: angular separation of charged track pairs (analysis for α-clustering physics)

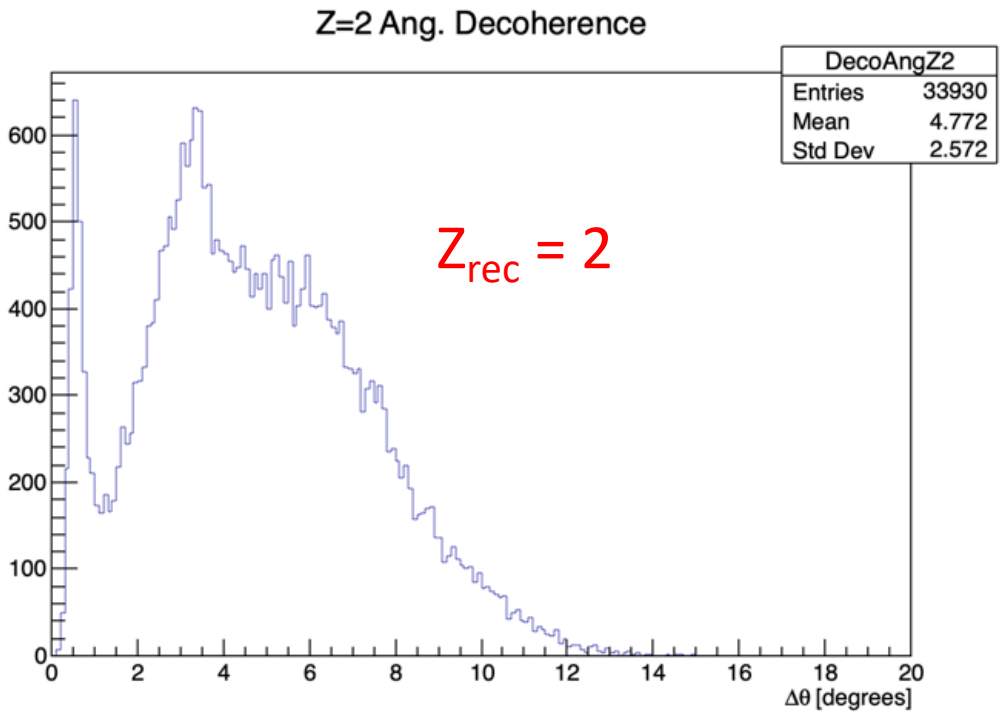


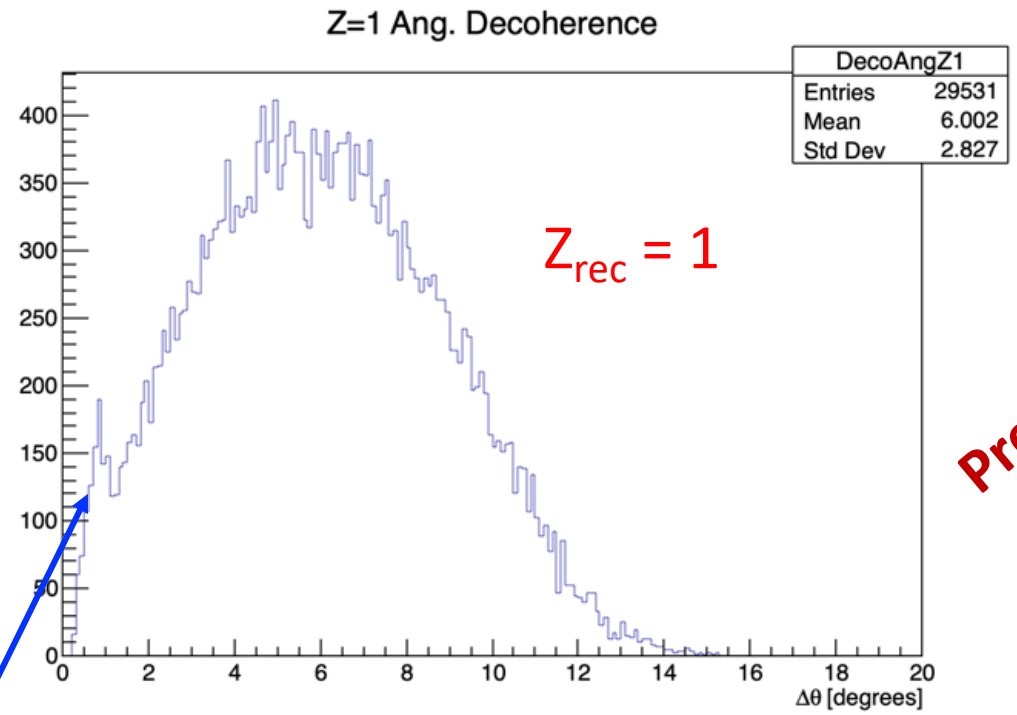
Preliminary

Z migration matrix



SHOE Reconstruction: angular separation of charged track pairs (analysis for α-clustering physics)



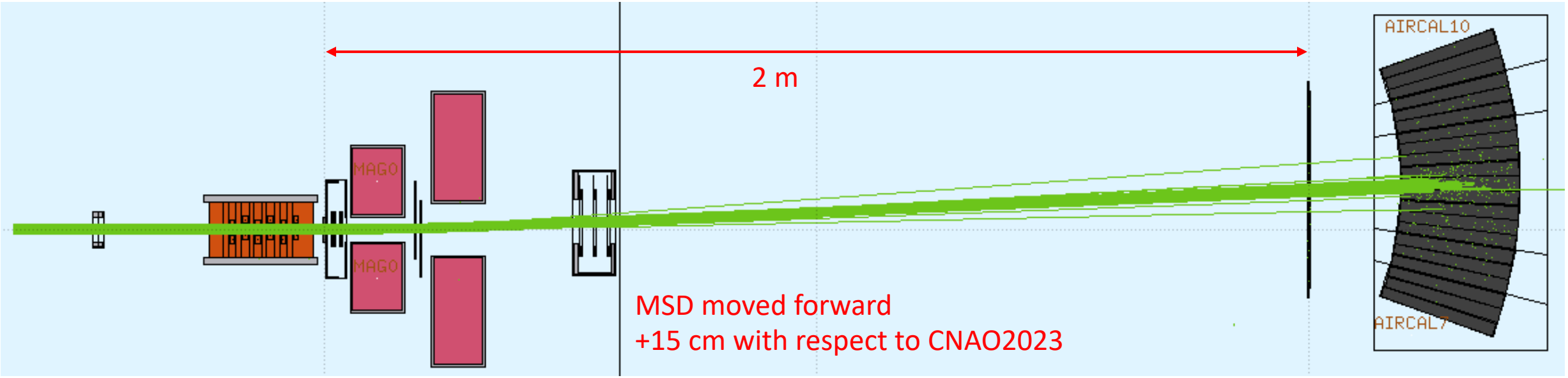


Preliminary

Probably Z = 2 misrecontructed as Z = 1

GSI25PS_MC Campaign for MAECI project

^{16}O @ 500 MeV/u



10^6 events - Shoe Genfit reconstruction

Warning: Z-id calibration not yet ready

To be presented at Collaboration Meeting

Conclusions

1. GSI21PS_MC simulation should be ready to be used successfully (more details at collaboration meetings)
2. CNAO23PS_MC simulation to be analyzed
3. GSI25PS_MC (preliminary for MAECI project). To be presented at collaboration meeting. *To be done: In order to be successfully reconstructed the TW calibration files for the new energy and target-TW distance are needed.*