



EMULSION ACTIVITY

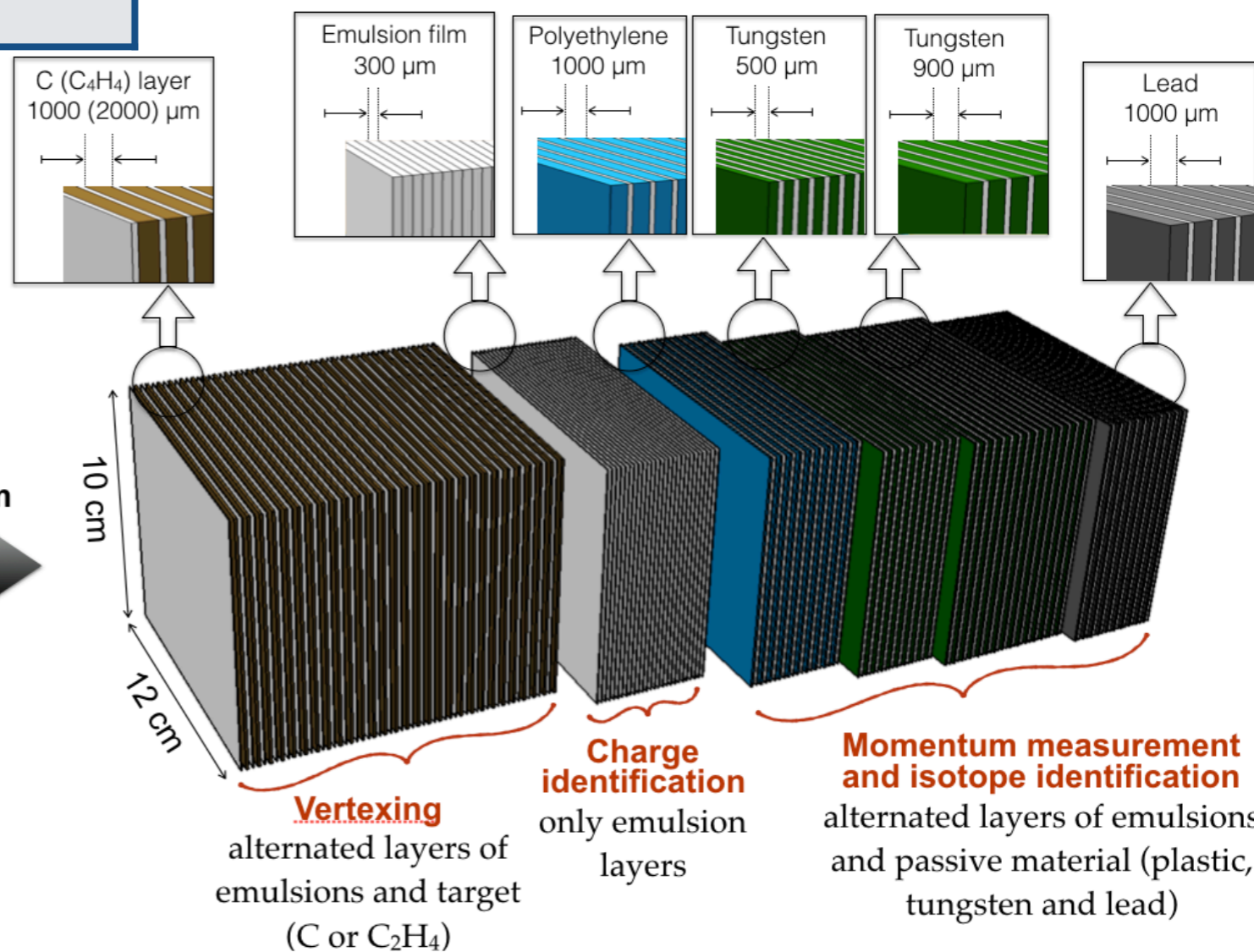
29/10/2019

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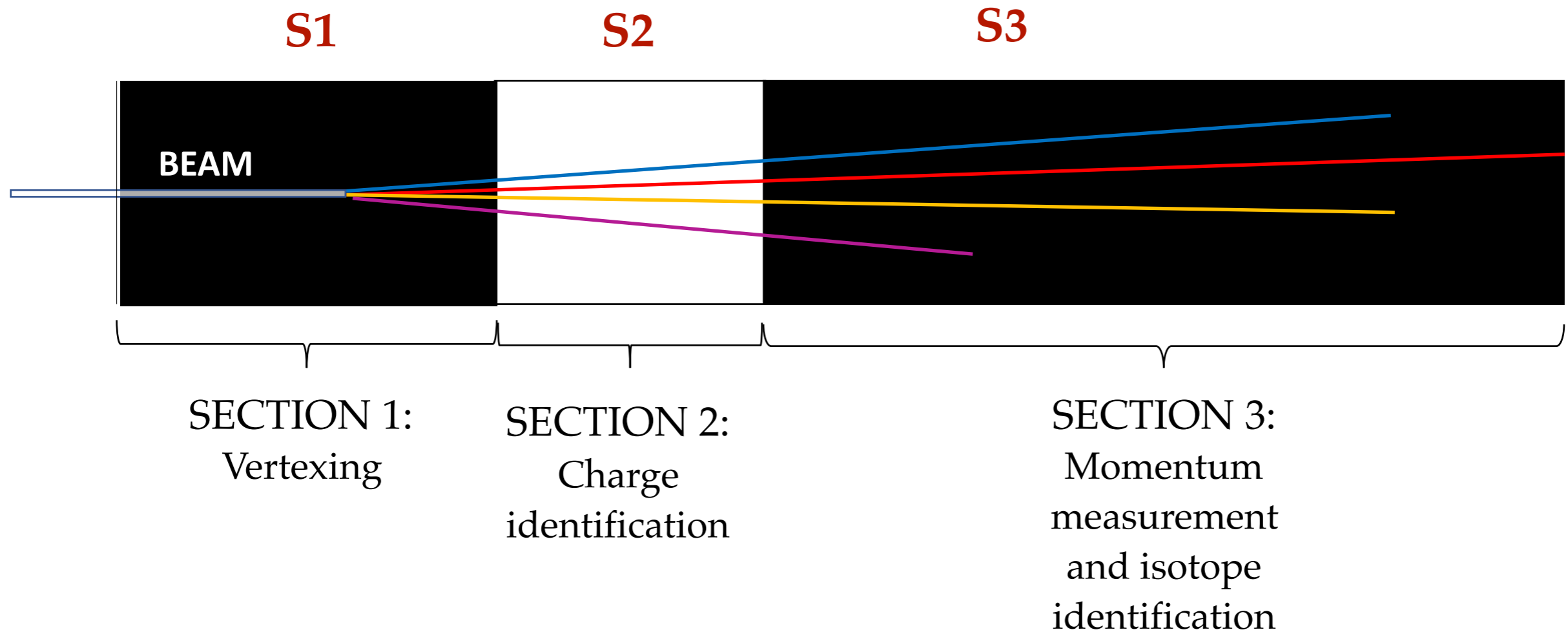
Università di Napoli "Federico II", INFN Napoli, INFN Bari

DATA TAKEN ON APRIL 2019 AT GSI

	BEAM	
TARGET	Oxygen 200 MeV/n	Oxygen 400 MeV/n
Carbon	GSI1	GSI3
Polyethylene	GSI2	GSI4



DETECTOR STRUCTURE



SCANNING STATUS:

- 204 / 520 emulsions scanned
- last month scanning has been interrupted for urgent work in lab: we will restart next week

ANALYSIS STATUS:

- GSI_2 (more details in the next slides):
 - ➔ optimization of tracking and vertexing algorithm analysis of S2 for particle's Z separation
- GSI_1: tracking of S3 (67-120) on-going

NEXT DATA TAKING (February 2020 at GSI)

- MC simulation of C(700 MeV / n) beam on a C / C₂H₄ targets in progress

OPTIMIZATION OF TRACKING ALGORITHM

OPERA



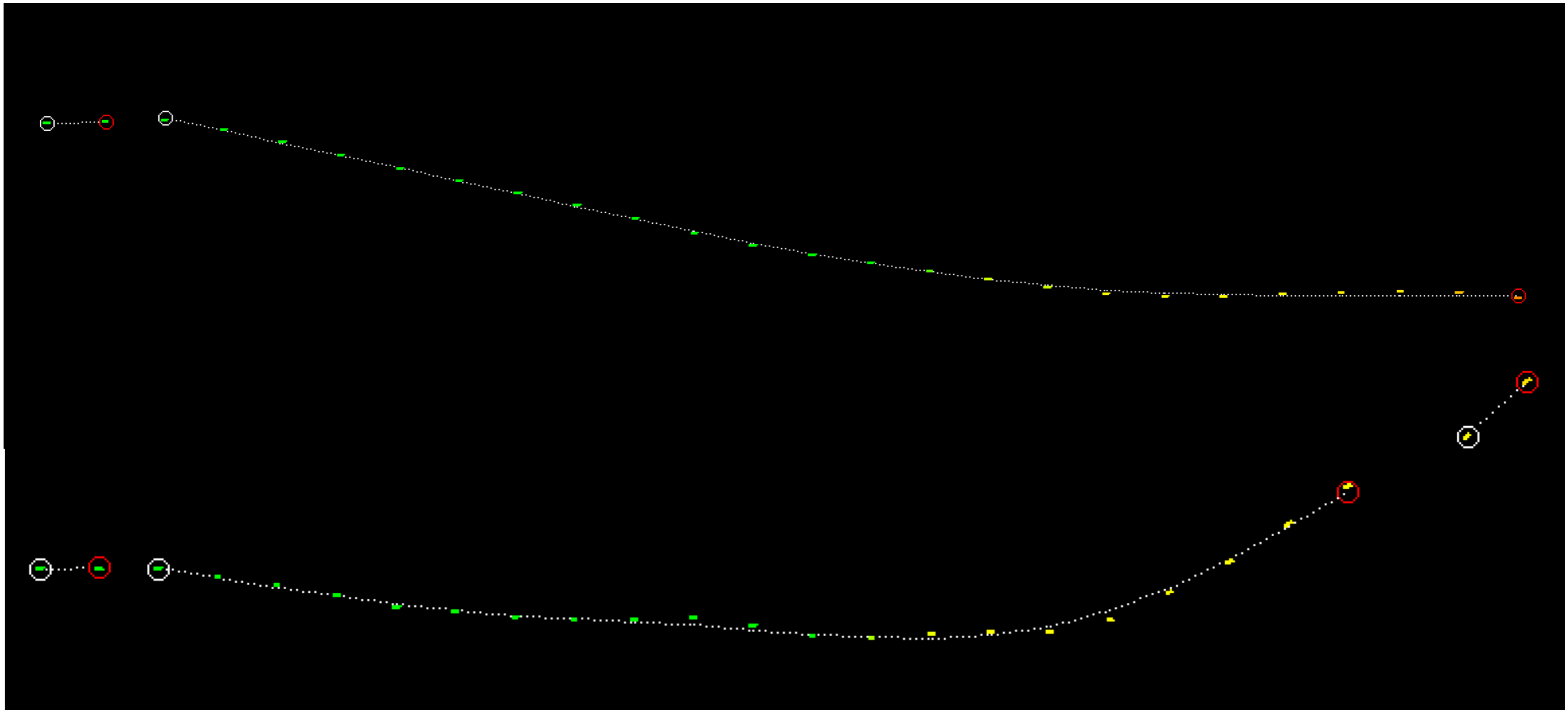
FOOT

- Higher Energy
- Less scattering
- Less ionizing particles

MONTECARLO RECONSTRUCTION

- MonteCarlo Simulation was converted into the raw data files format and underwent the tracking reconstruction with official software used in OPERA (FEDRA)

EXAMPLES OF TRACKING ISSUES (MONTECARLO)



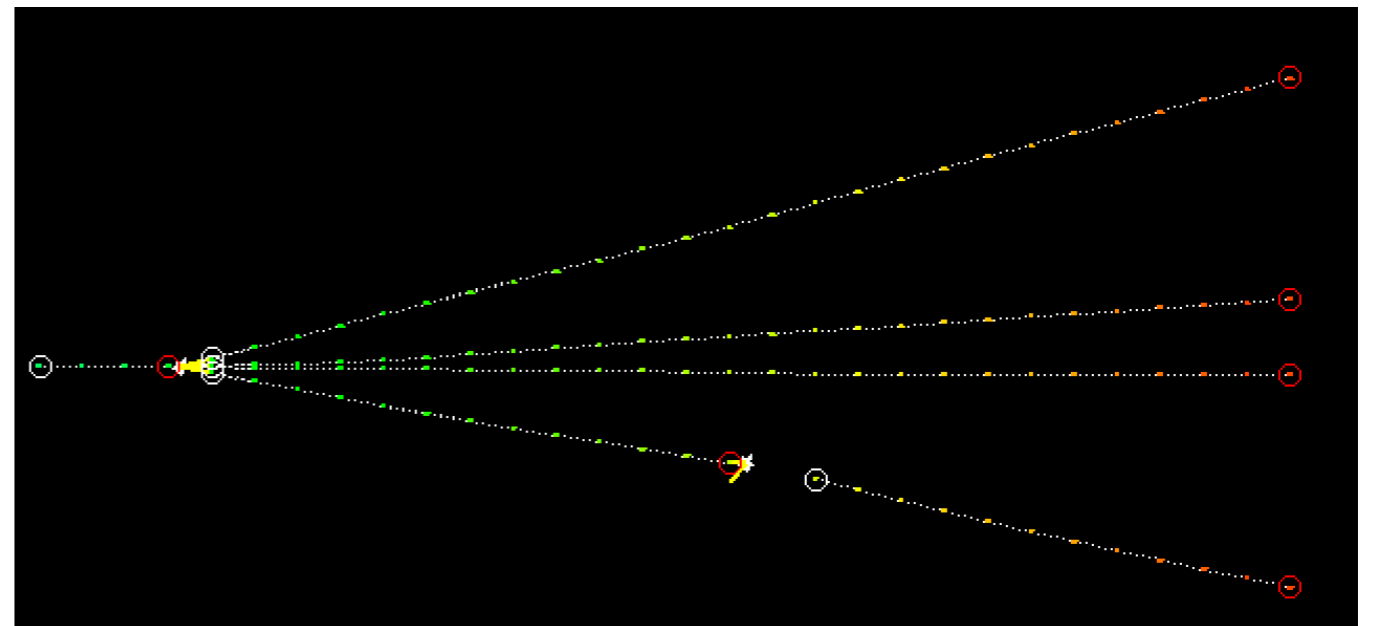
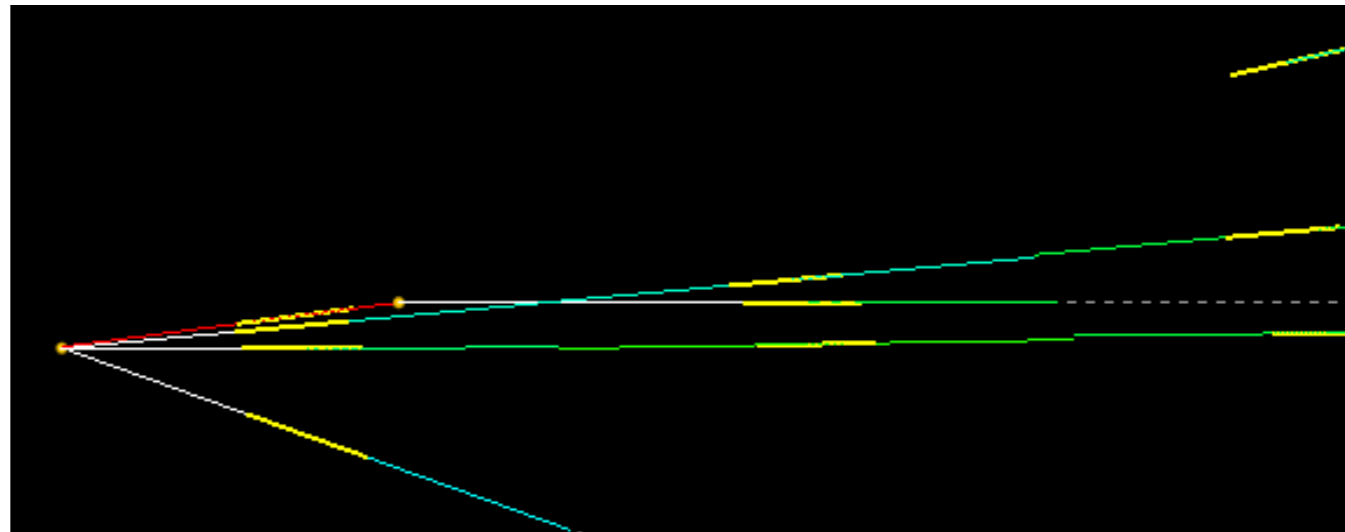
- Optimisation of tracking algorithm parameters based on an event-by-event inspection
- Many improvements outlined and implemented

OPTIMIZATION OF VERTEXING ALGORITHM

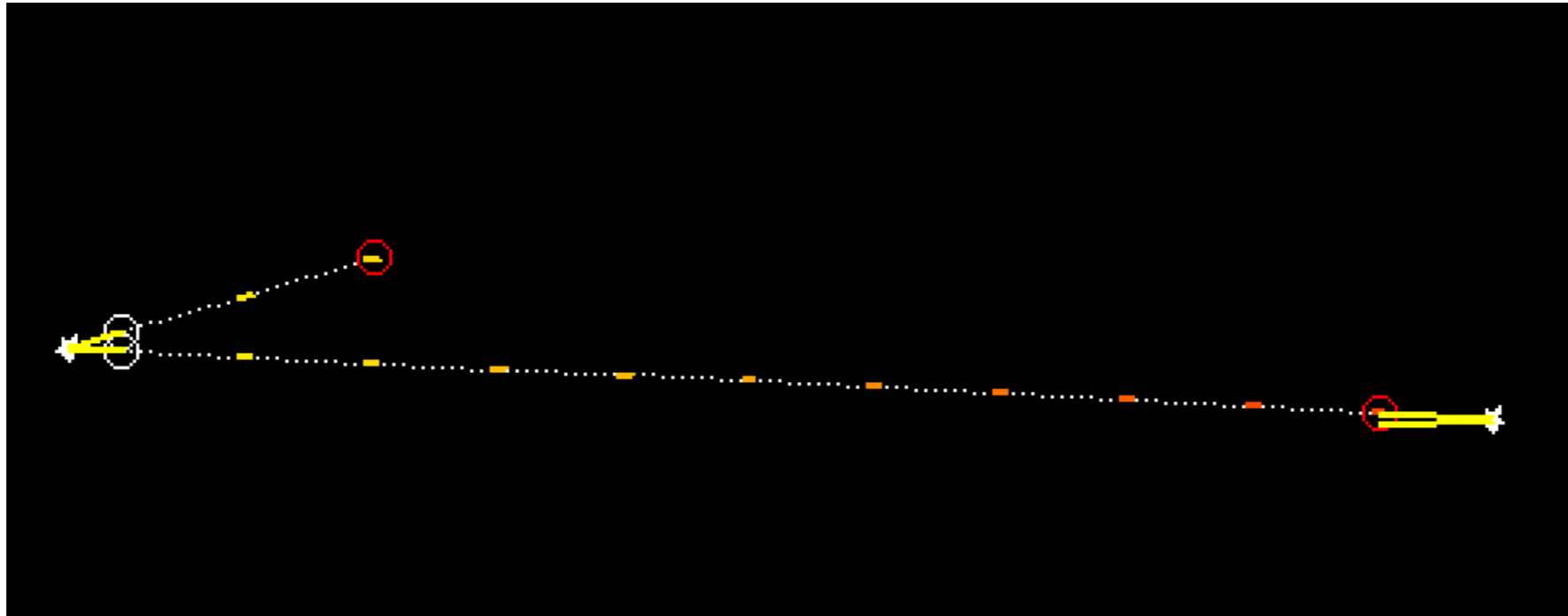
OPERA



FOOT

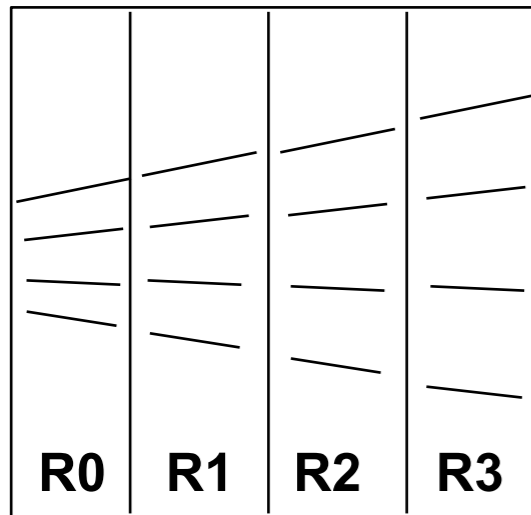


EXAMPLES OF VERTEXING ISSUES



- Optimisation of vertex reconstruction based on an event-by-event inspection
- New algorithm optimized for FOOT

PARTICLE'S Z SEPARATION IN S2



$z = 1$ (H)

$z = 2$ (He)

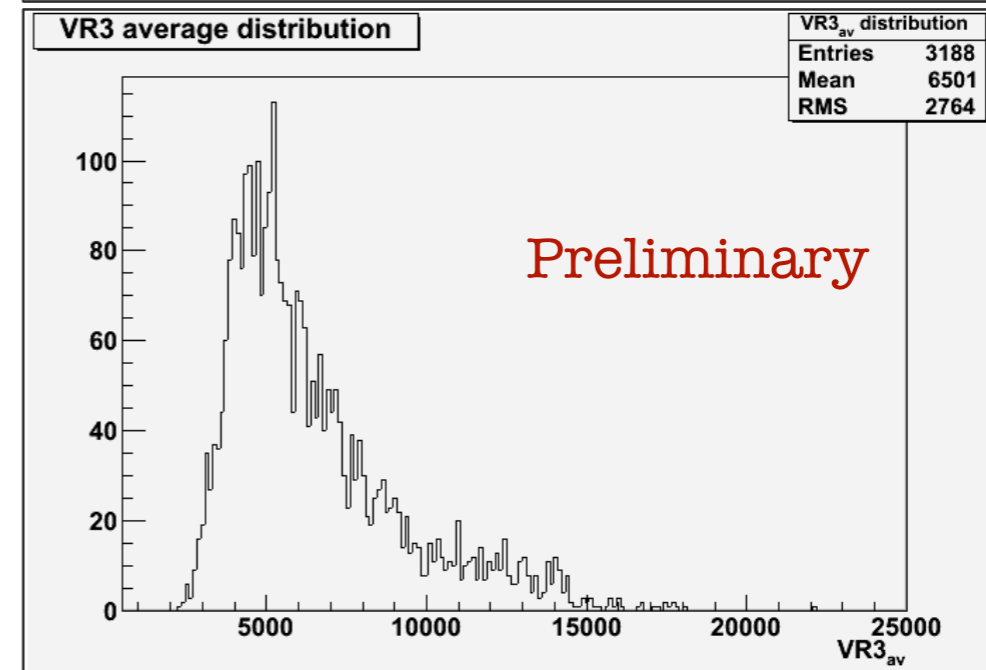
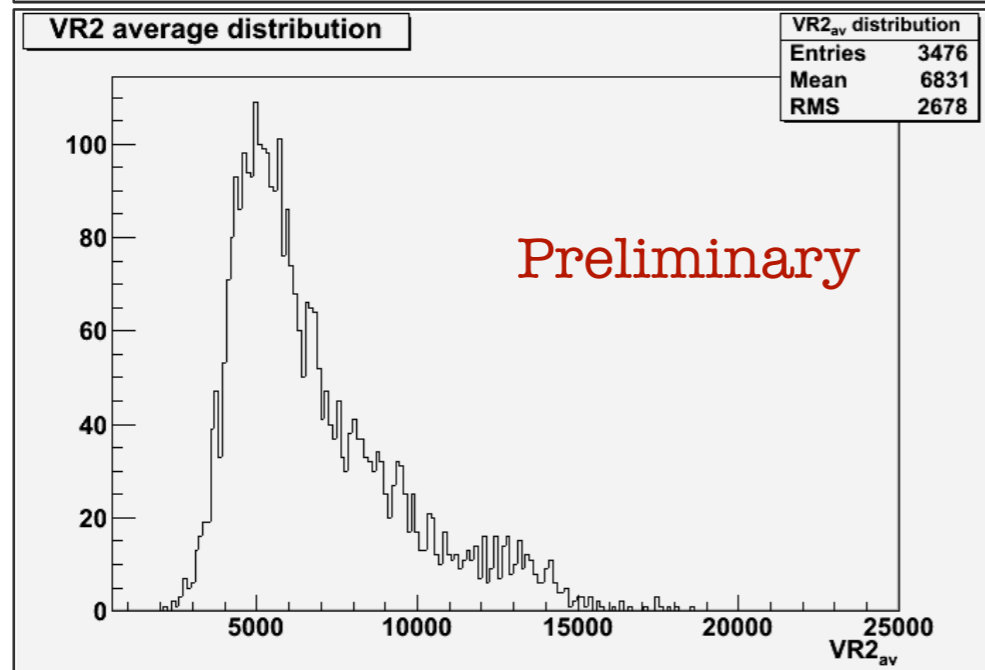
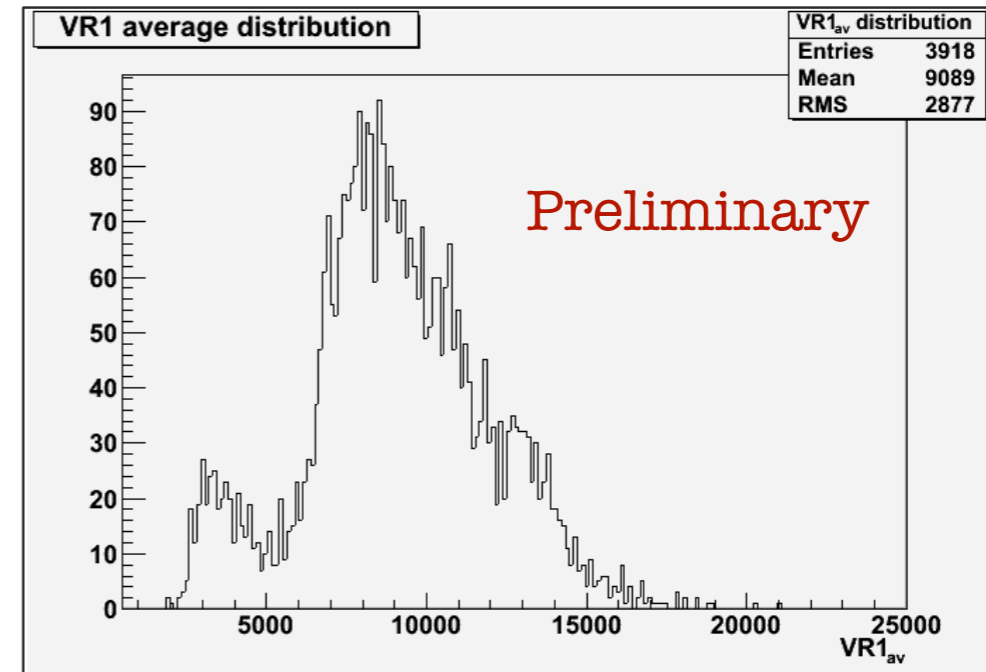
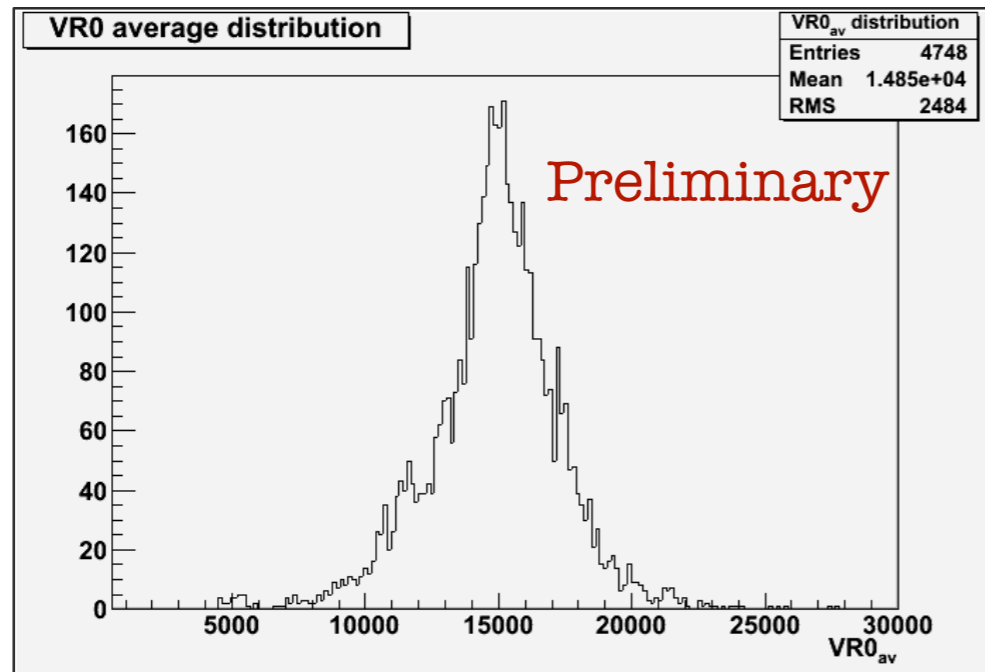
$z = 3$ (Li)

$z > 3$

- R0 is not refreshed;
- R1 is refreshed at 28°C and at 95% RH;
- R2 is refreshed at 34°C and at 95% RH;
- R3 is refreshed at 36°C and at 95% RH

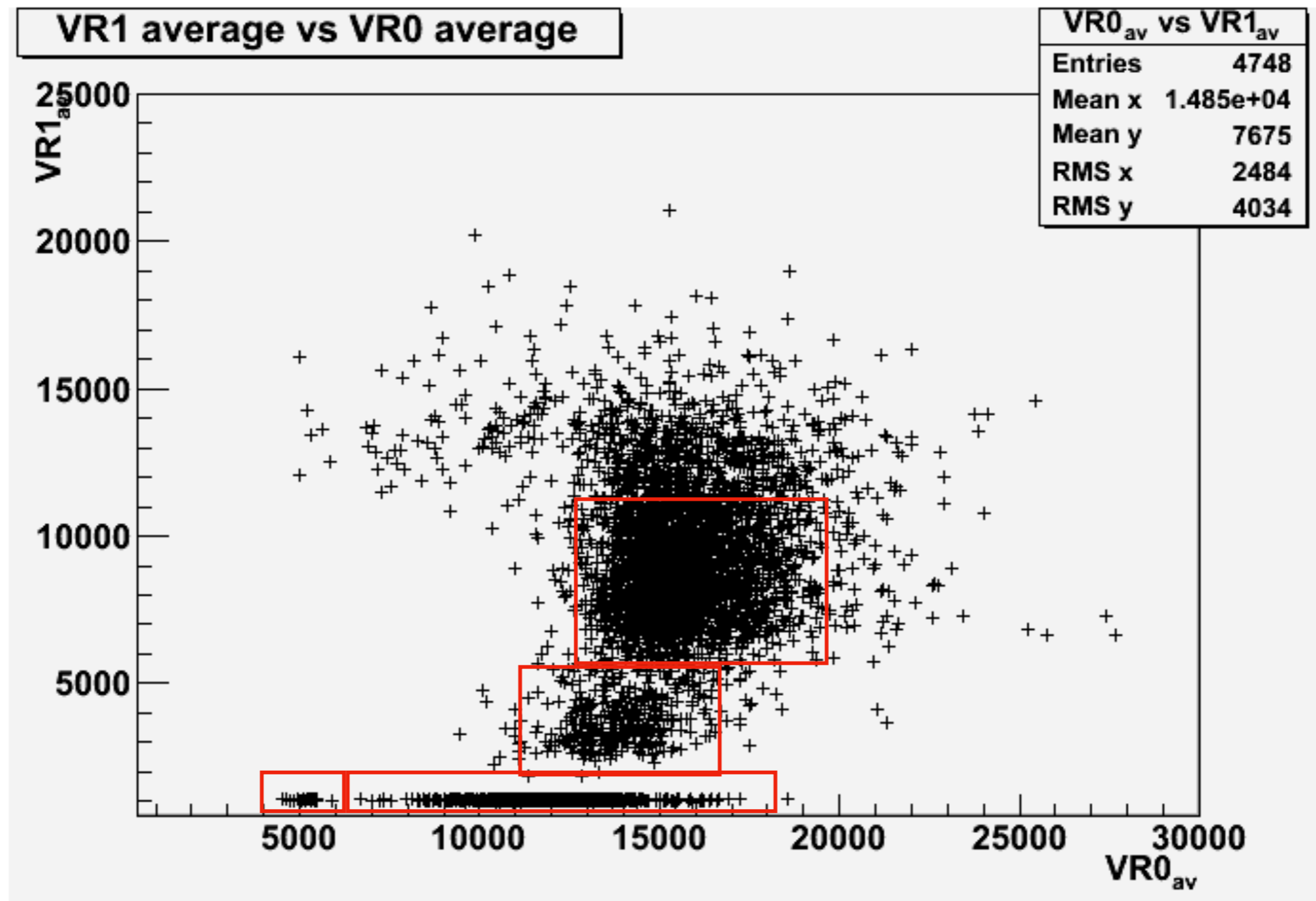
DISCRIMINATION THROUGH VOLUME TRACK

- Track Volume is a measurement of its ionization
- Each track is characterized by four volume variables, referred to as VR0, VR1, VR2 and VR3.



- Combining VRx information it is possible to identify low-Z particles ($Z \leq 3$)

DISCRIMINATION THROUGH VOLUME TRACK



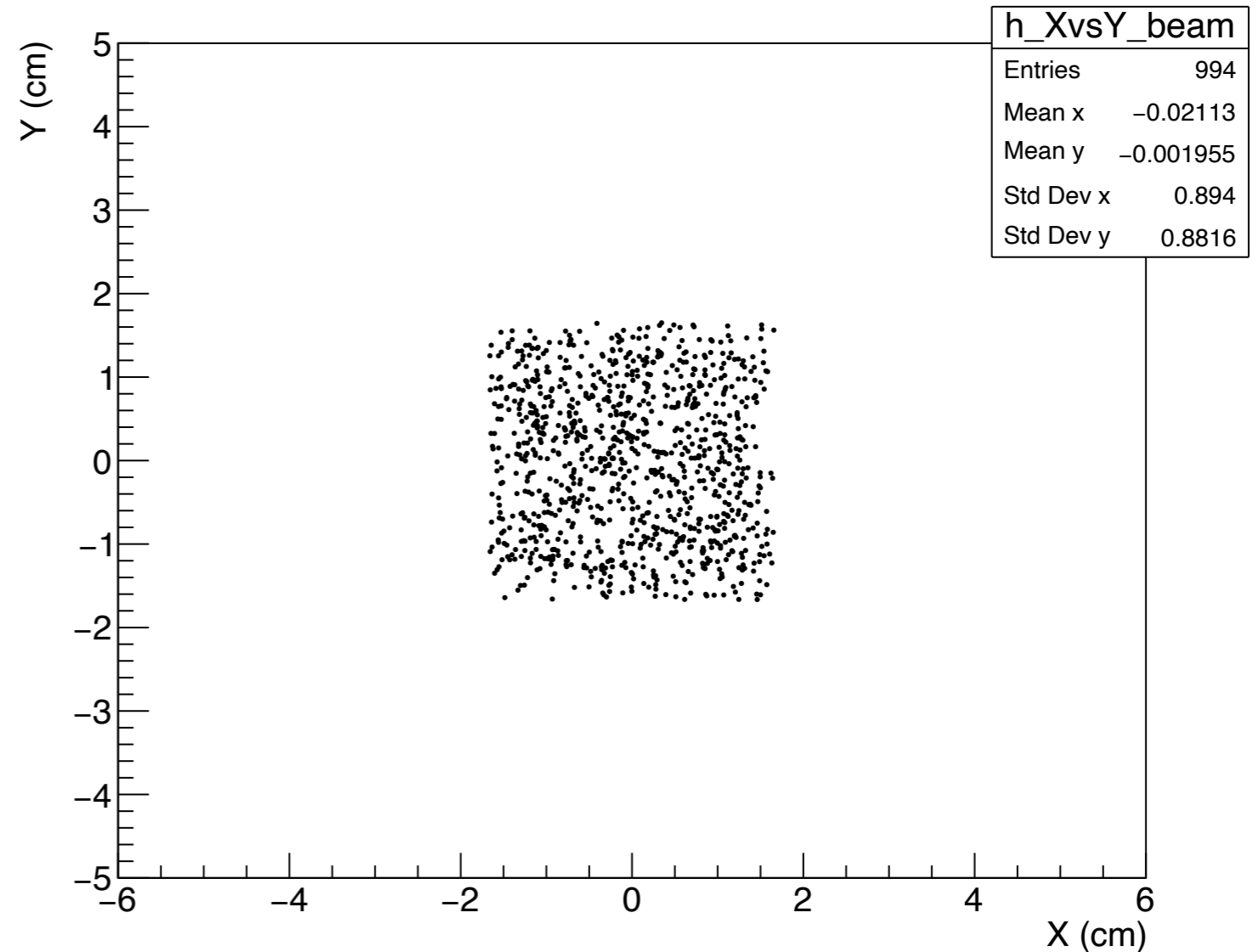
MC SIMULATION OF
C(700 MEV / N) BEAM
ON A C / C₂H₄ TARGETS

S1 OPTMIZATION ON-GOING

BEAM CHARACTERISTICS

- Carbon @ 700 MeV/n
- Rectangular Shape
- Isotropic distribution
- @-30cm in z

Beam position at Z=0



GEOMETRY

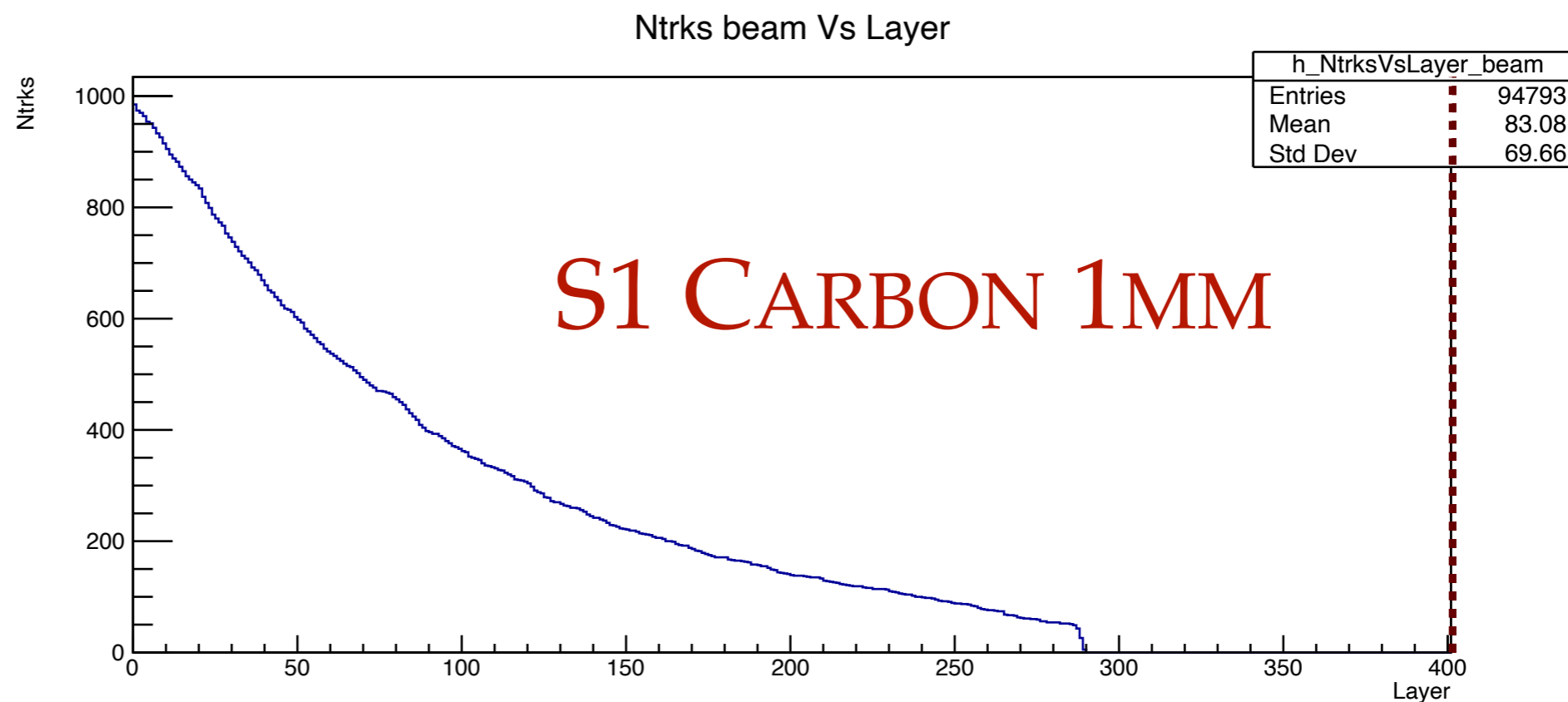
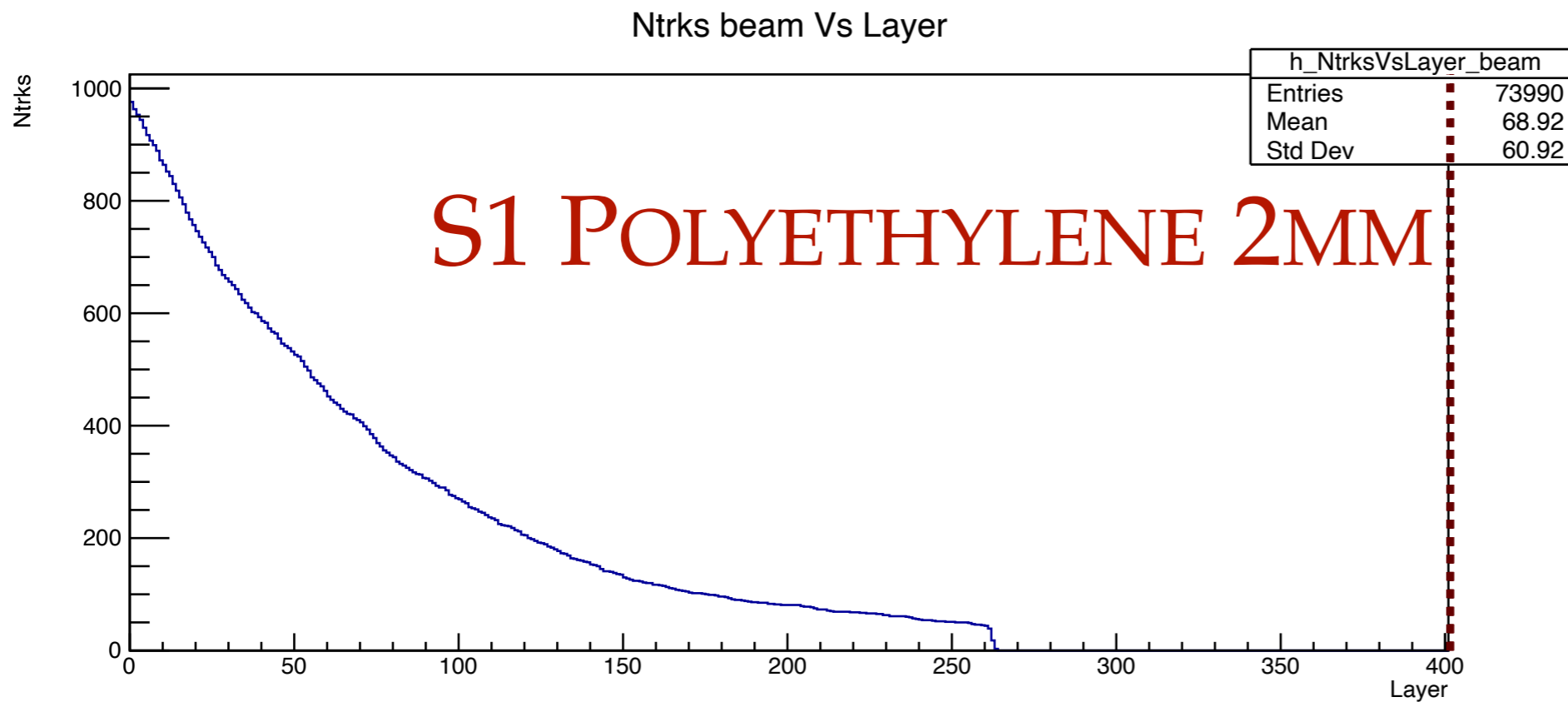
- Only S1: 400 cells of polyethylene (2mm) or carbon (1mm)

INTERACTIONS

LAYER

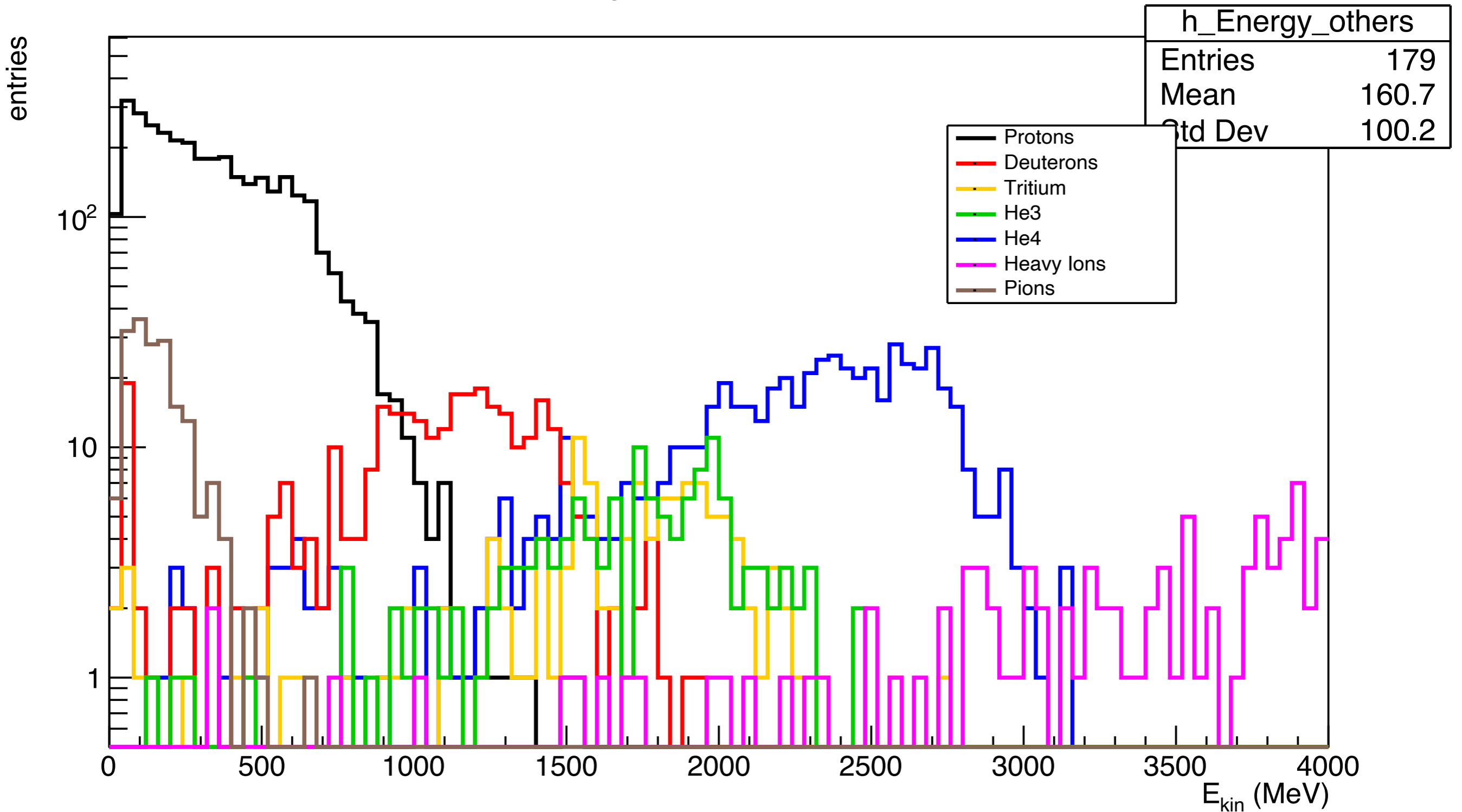
	Carbon	Polyethylene
Beam particles	1000	
Reach S1	99.6%	99.4%
20	16.0%	24.30%
40	33.1%	40.70%
60	45.9%	53.80%
80	54.1%	65.30%
100	63.4%	72.90%
120	69.3%	79.40%
140	75.5%	84.30%
160	79.4%	88.30%
180	82.9%	90.40%
200	85.9%	91.90%
220	88.1%	93.20%
240	90.0%	94.40%
260	92.3%	95.50%
280	94.6%	100.00%
300	100.00%	100.00%
320	100.00%	100.00%
340	100.00%	100.00%
360	100.00%	100.00%
380	100.00%	100.00%
400	100.00%	100.00%

INTERACTIONS



S1 POLYETHYLENE 2MM

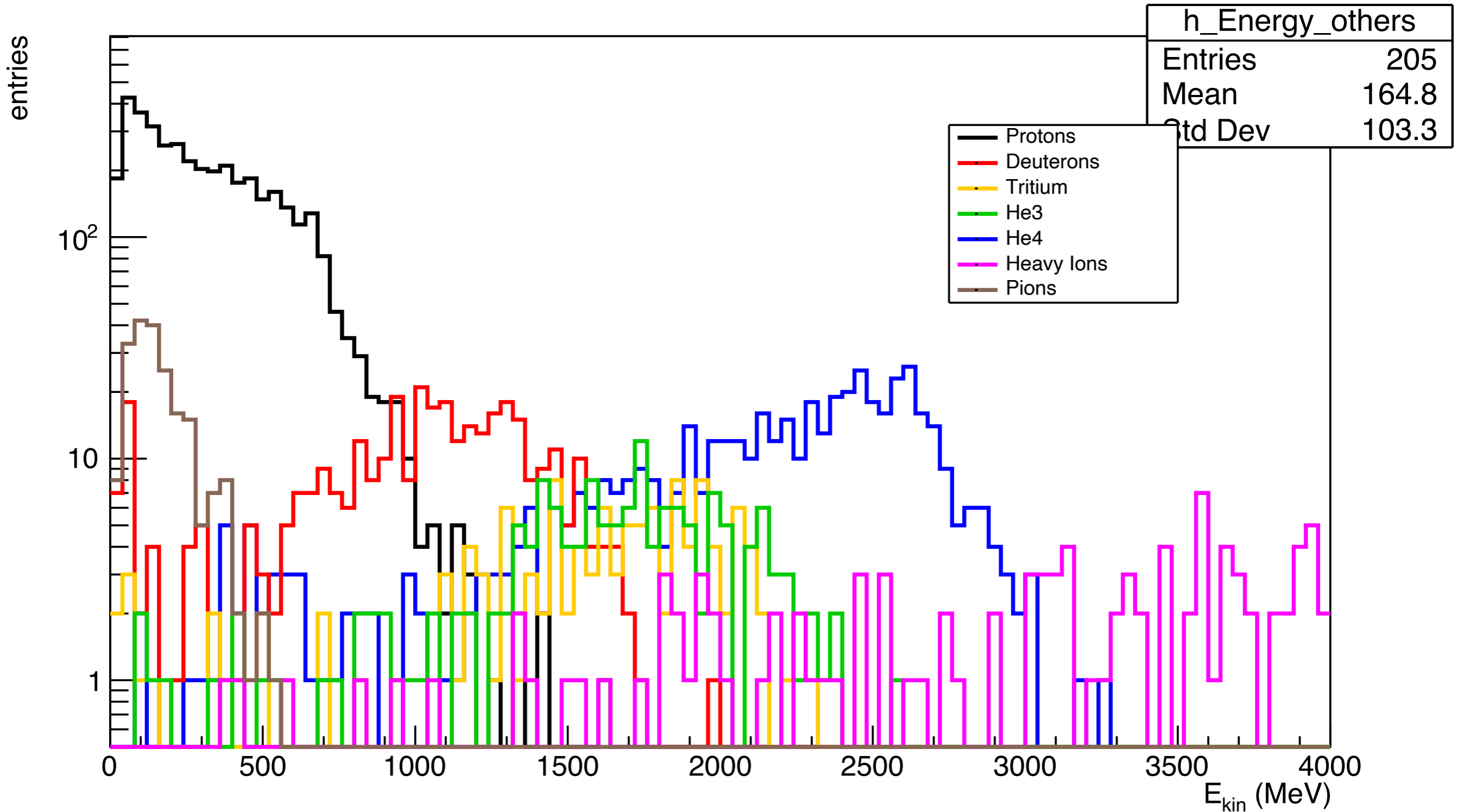
Energy distribution S1



- Initial Kinetic Energy of daughter tracks in S1

S1 CARBON 1MM

Energy distribution S1



PROSPECTIVES FOR NEXT MEETING

SCANNING:

- To be completed by February / March 2020

ANALYSIS STATUS:

- Complete Tracking and vertexing of GSI_2
- Vertex reconstruction in S1
- Particle's charge separation (S2)

NEXT DATA TAKING (February 2020 at GSI)

- Proposal of detector structure for next data taking