BEALINE DATACARD & RECOIL RATE

RGH WORKSHOP

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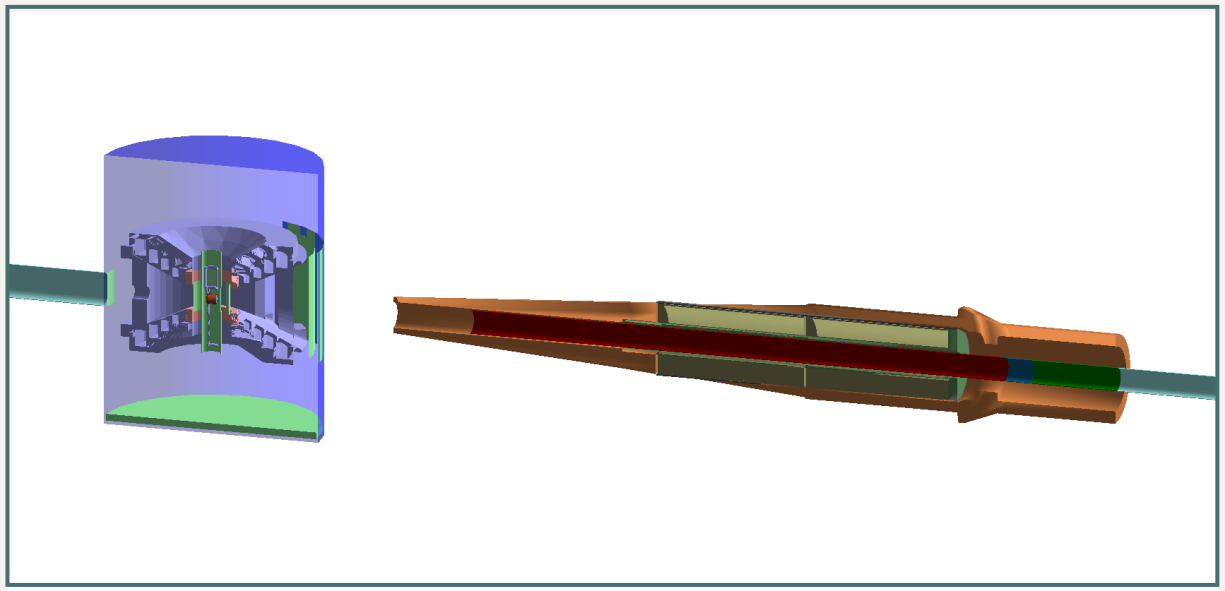
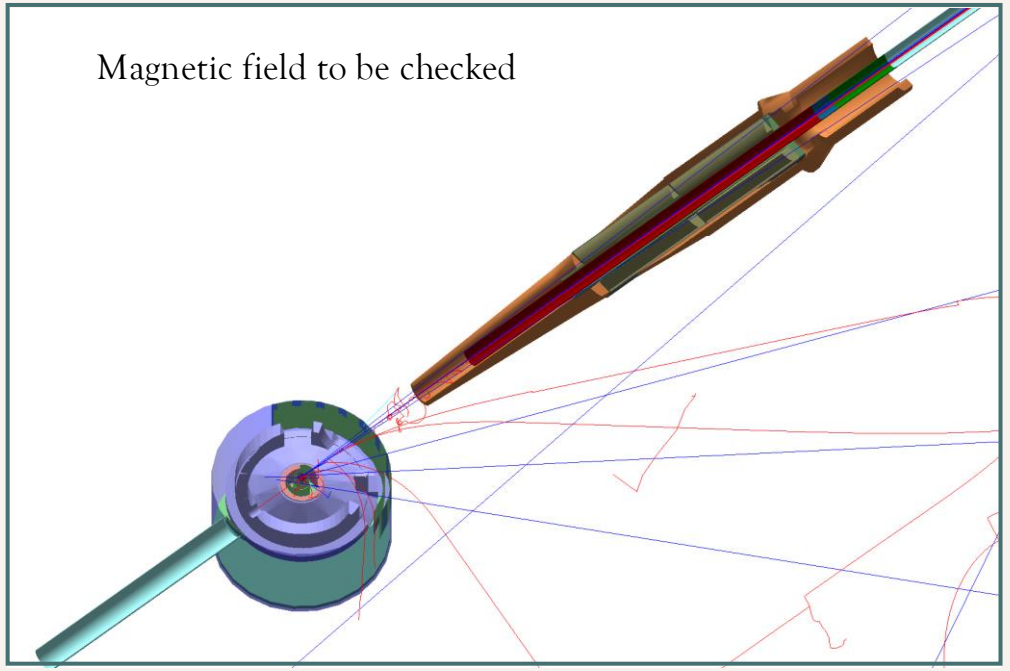
BEAMLINE DATACARD

Started from the Marco.gcard and a basic version on Clas12Tags for the Transverse configuration.

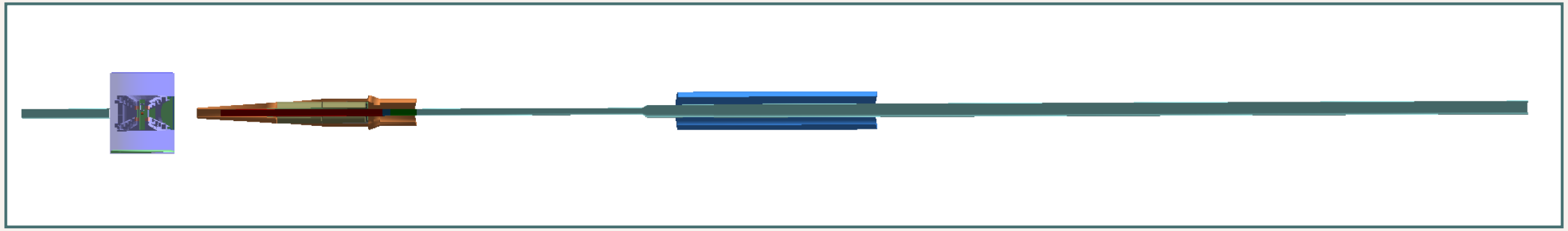
The beamline datacard are now written in accordance with the Clas12Tags environment and is ready (or near to that) to be shared with the group.



Insight of the Cryocan and ELMO shield region of the beamline.



BEAMLINE DATACARD



- **Beam pipe**: ‘G4_Galactic’ + ‘G4_STAINLESS_STEEL’. Limit $-1204.5\text{mm} < z < 13900\text{mm}$:
  - **Upstream**: radius is 50mm (48.350 + 1.65).
  - **Downstream**: radius from 34.925mm (33.275 + 1.65) up to 68.0mm (64.0 + 4.0).
- **ELMO:** ‘beamline_W’ + ‘G4_Pb’ + ‘G4_STAINLESS_STEEL’. Limit $553.2\text{mm} < z < 2749.2\text{mm}$:
  - **Cone and Shield:** (W) radius from **53.28mm up to 170mm.**
  - **Two Cylinders + Jackets:** (Pb+W) internal/external radius of 47.62/100.77mm + 100.78/105.77mm.
  - **Box casing:** (SS) Around the Cylinders $1352.35\text{mm} < z < 2268.35\text{mm}$, with radius of 105.78/109.54mm

RECOIL DETECTOR – GEN LEVEL

RECOIL AIM: Detect charged particle at large angle complementary to the CLAS12 FD.

TRACKING: Proposed μRWELL technology. Spatial resolution of $\approx 100\mu m$ and Timing $< 10ns$.

Time-of-Flight: Scintillator bars read out by SiPMs. Target of sub-ns timing.

Dimensions of the RGH recoil detector planes covering the magnet apertures, from the RGH proposal.

Plane	Name	Distance from IP (mm)	Width (mm)	Height (mm)
1	Tracker Region 1	440	230	420
2	Tracker Region 2	720	380	670
3	Tracker Region 3	1000	530	920
4	Time-of-flight	1180	650	1100

ACCEPTANCE: Magnet opening extend to $\approx 70°$. Vertical coverage $\pm 25°$. Horizontal $29°$ per arm.*

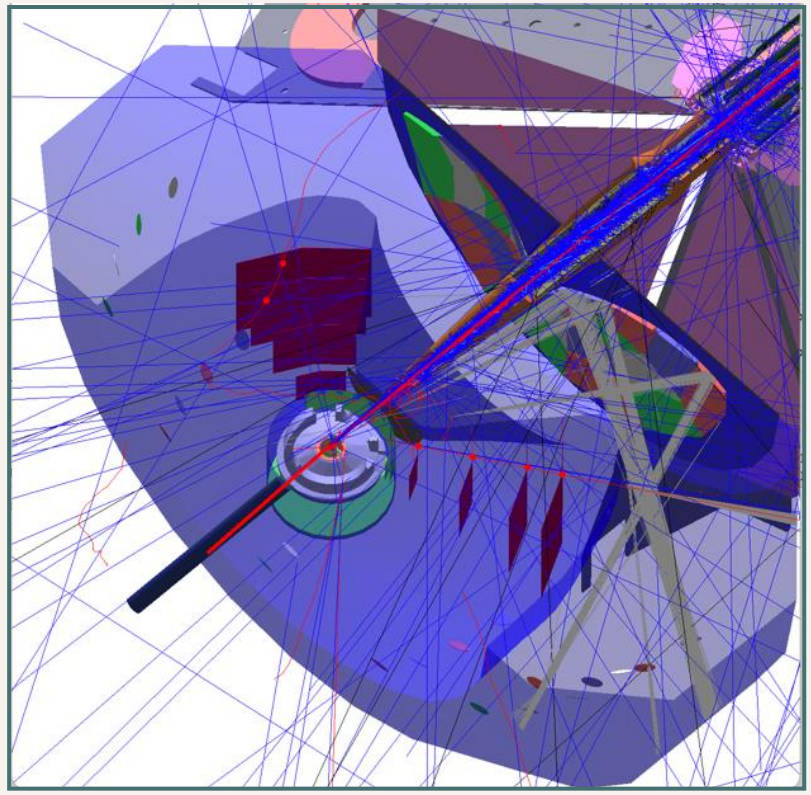
GOAL: Imput for the μRWELL anode design and ToF tessellations.

Use a flux detector to study the rate per squared cm or bar equivalent area.

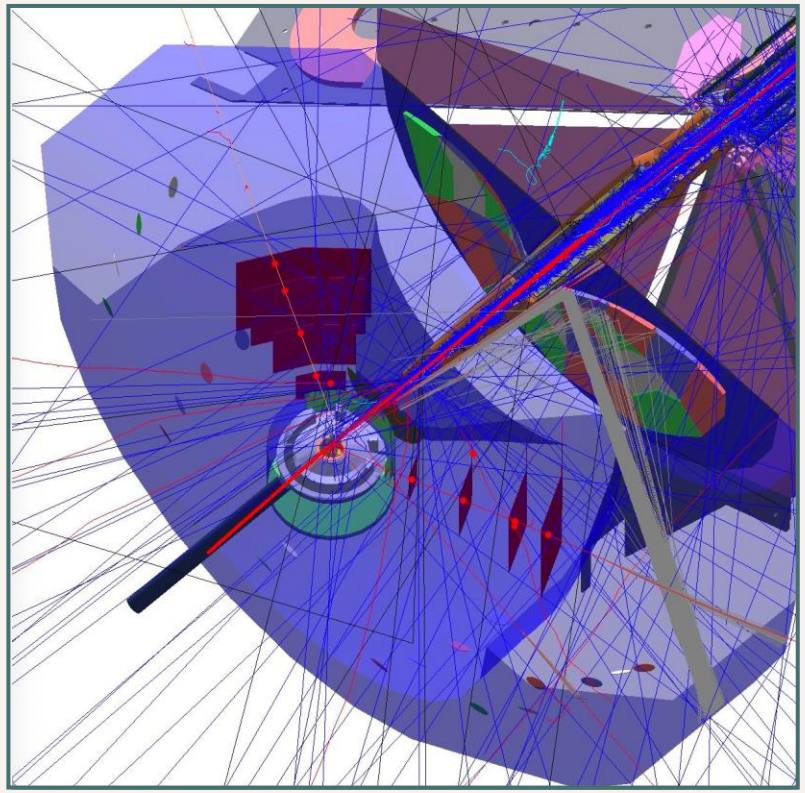
*It has a blind central region of $40°$

RECOIL DETECTOR– GEN LEVEL

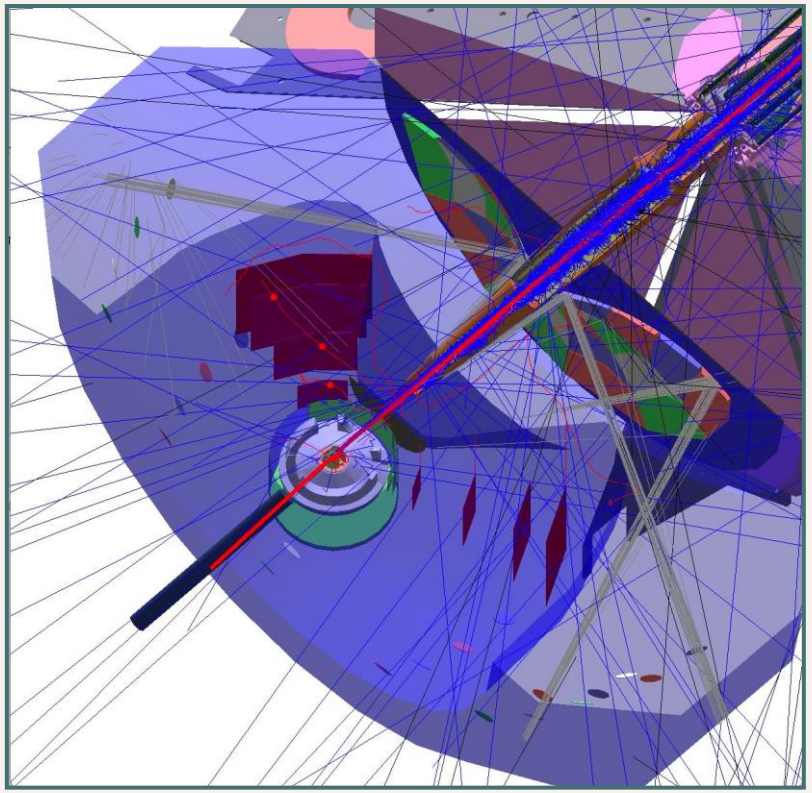
Example of 400 generated particle in a time window of $252ns$.



Signal from the Target and Cryostat.



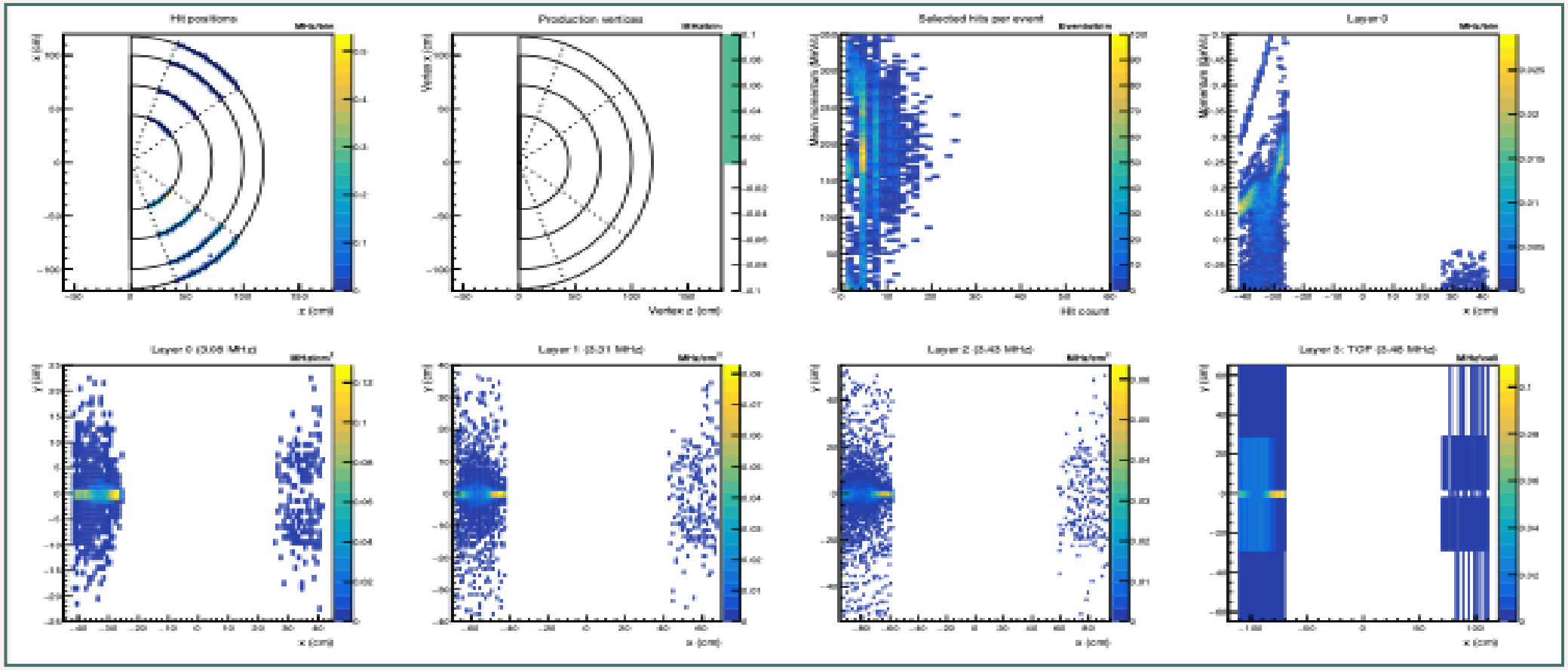
Signal from the Target region.



Signal from the Shield (ELMO).

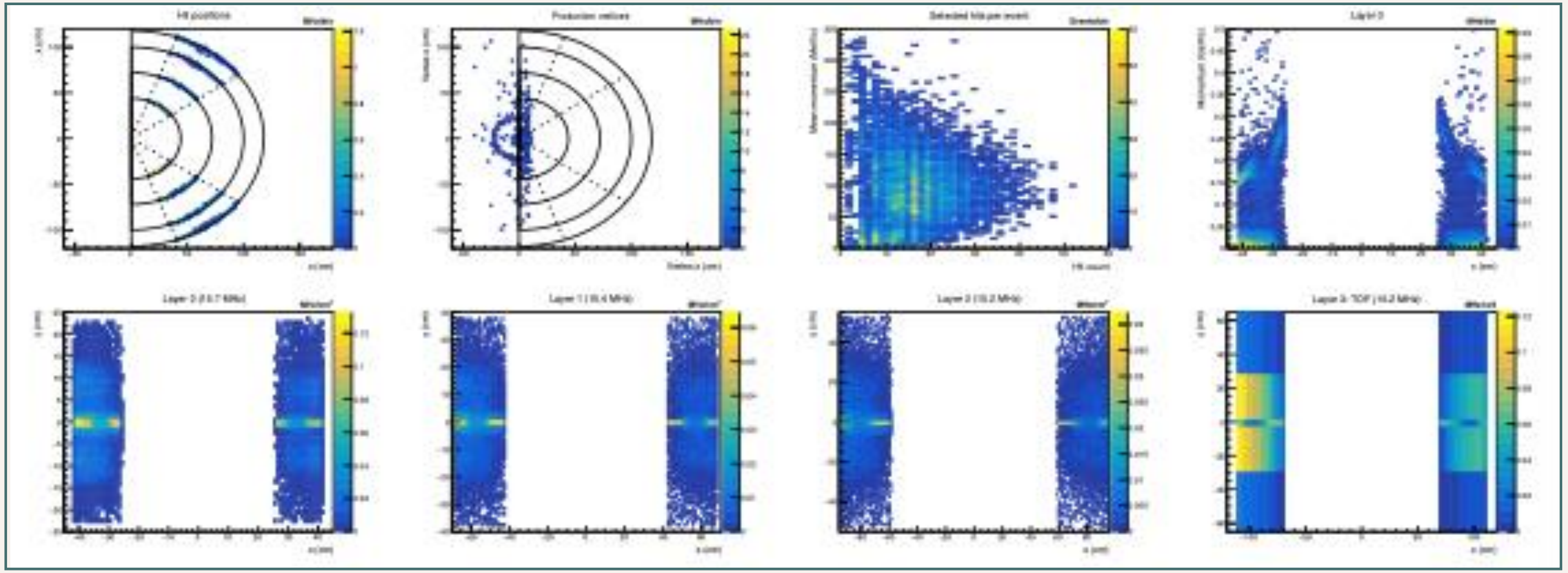
RECOIL RATE – BREMSSTRAHLUNG

Produced 12000 events. Interaction vertex $< -890\ mm$.



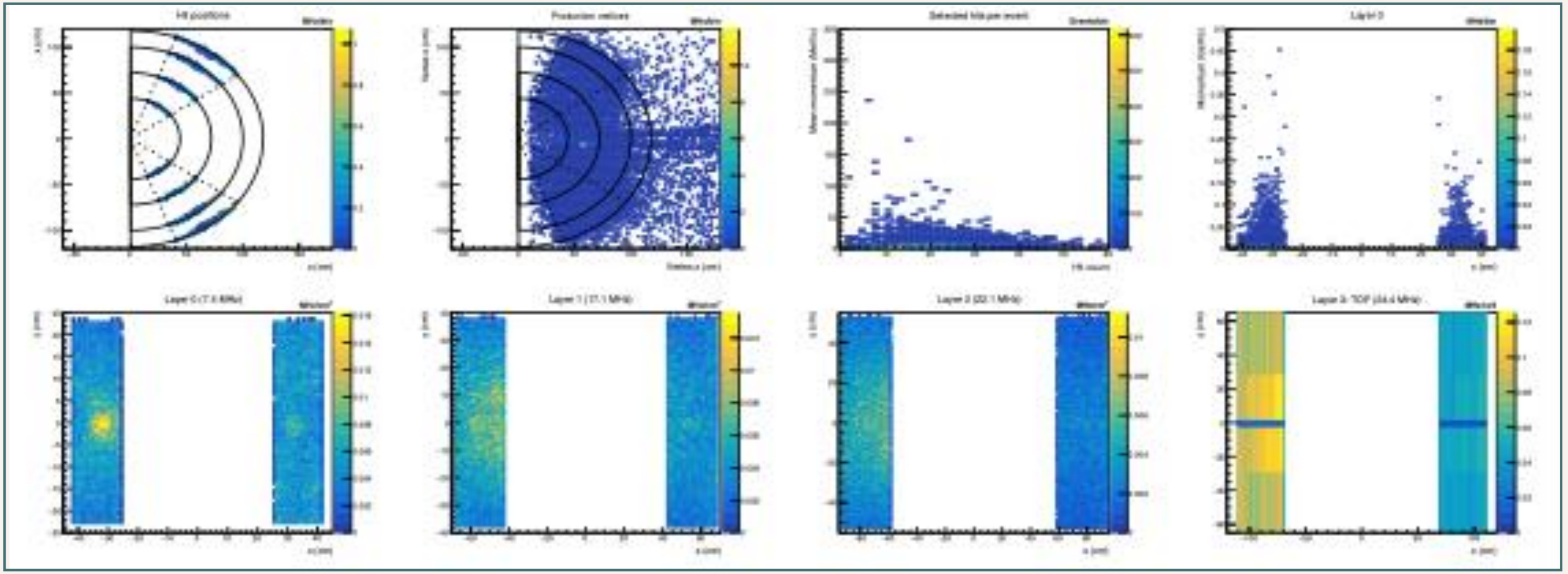
RECOIL RATE – TARGET REGION

$-890\ mm <$ Interaction vertex $< 100\ mm$.



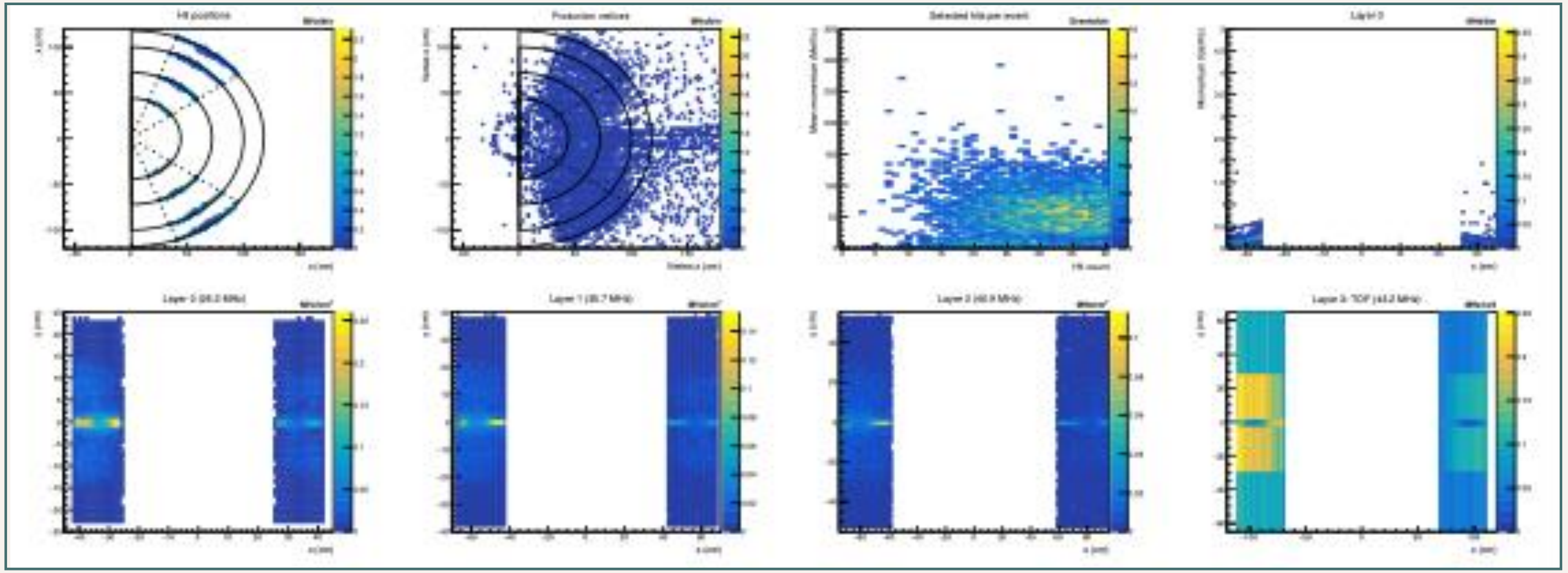
RECOIL RATE – SHIELD

Interaction vertex $> 100\ mm$.



RECOIL RATE – OVERALL OCCUPANCY

Contribution from all the charged particles.



THANKS