I working on the simulation aiming for the understanding the BigBite acceptance in term of momentum and theta and phi. Currently working on the dipole only within the coil area (blue area in figure below).

The location of magnet and detector are known from the survey. The area where the dipole magnet is not so certain.

Simulation start with random momentum [0.2 to 1.2] GeV and angle theta and phi such that the dOmega = sin(theta)d(theta)d(phi) is uniform.

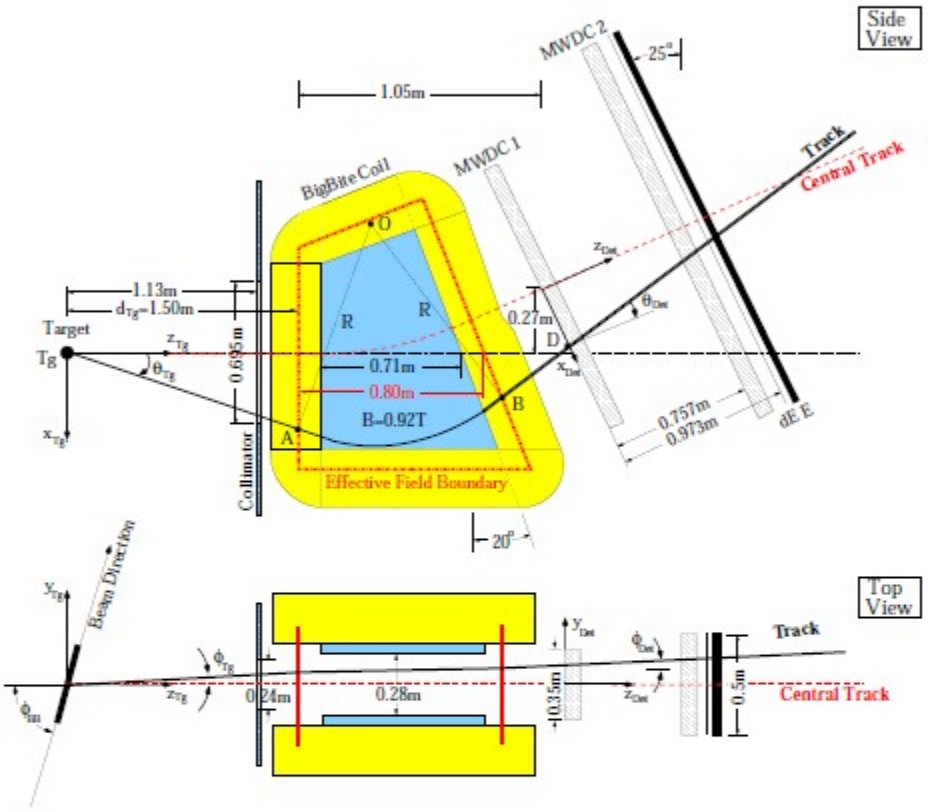
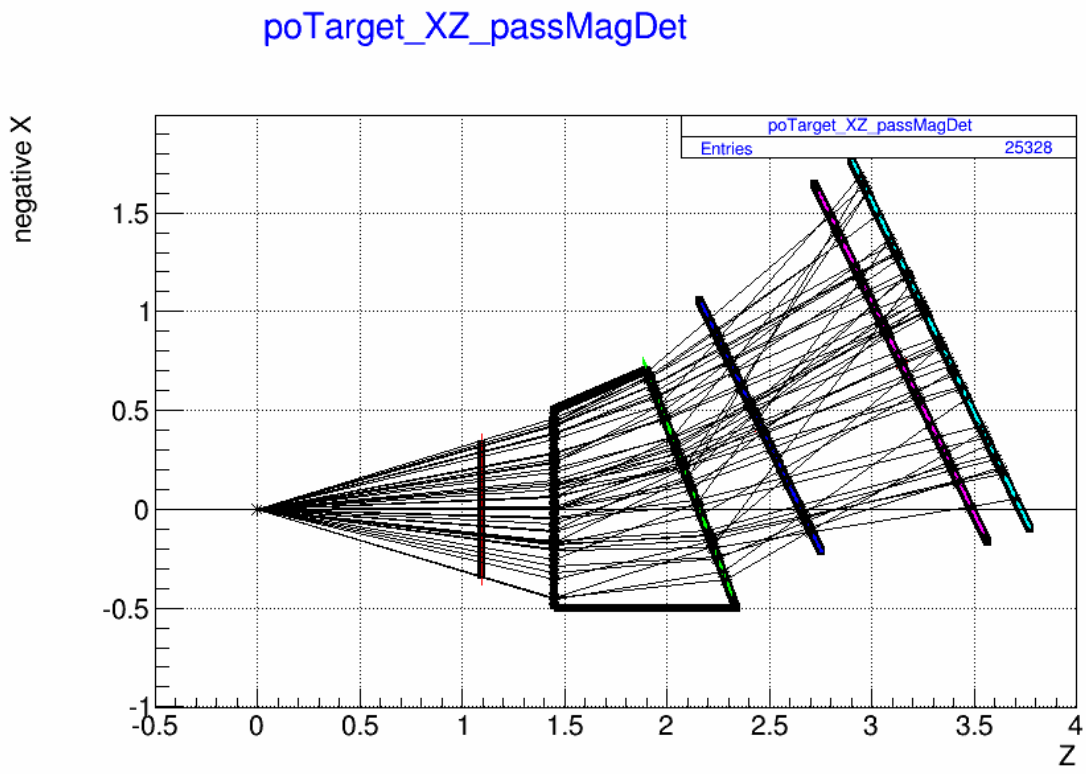


Figure 4: The schematic of the dispersive (top) and non-dispersive (bottom) planes of the BigBite spectrometer. Small angular deflections in the non-dispersive plane occur if the particle trajectory is not perpendicular to the effective field boundary [2, 19, 20]. At the entrance to the magnet, they are at most 18 mrad (close to the acceptance boundaries in the dispersive direction). At the exit field boundary, the effect acts in the opposite sense and partially cancels the deflection at the entrance.

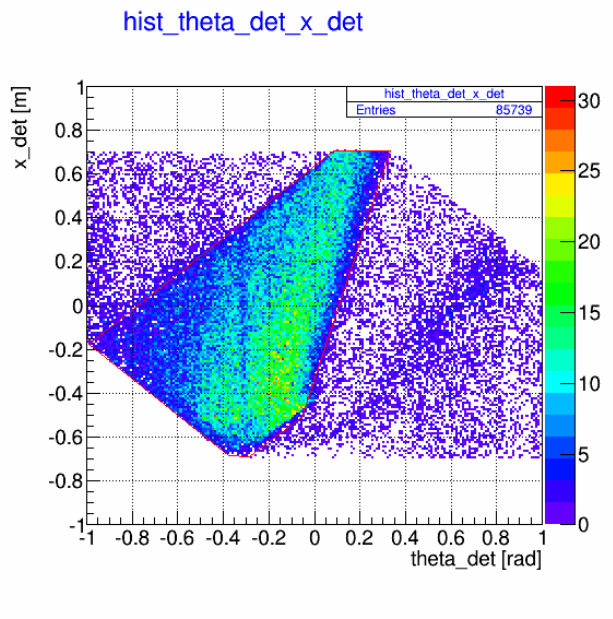
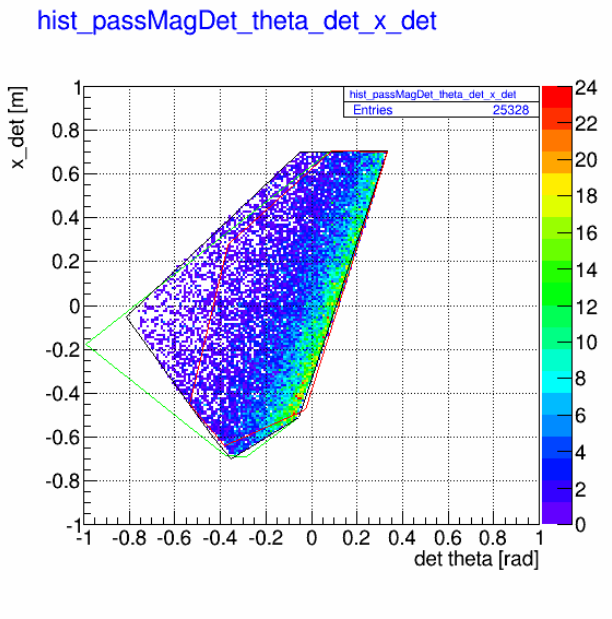
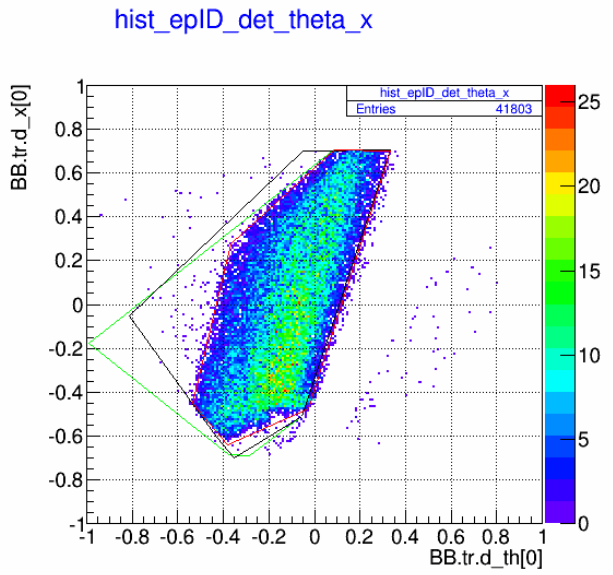
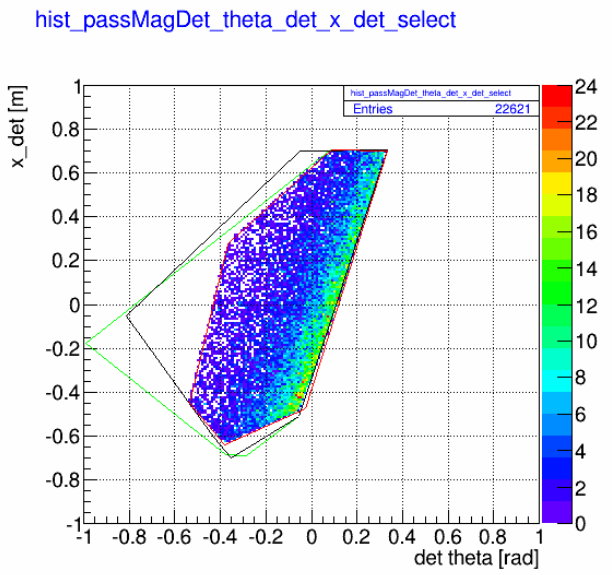


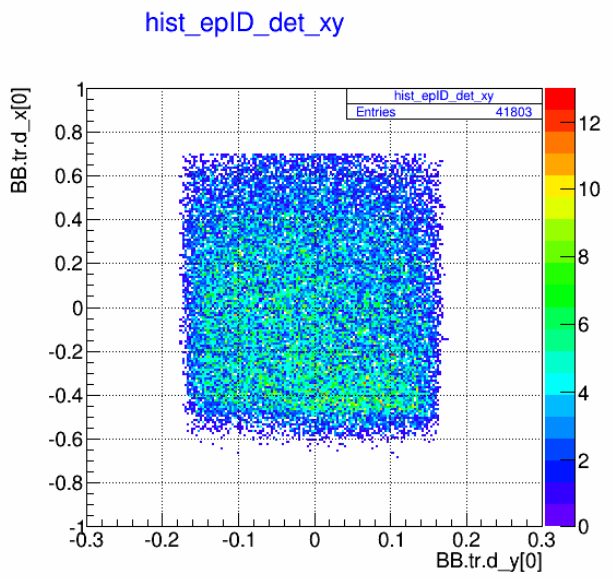
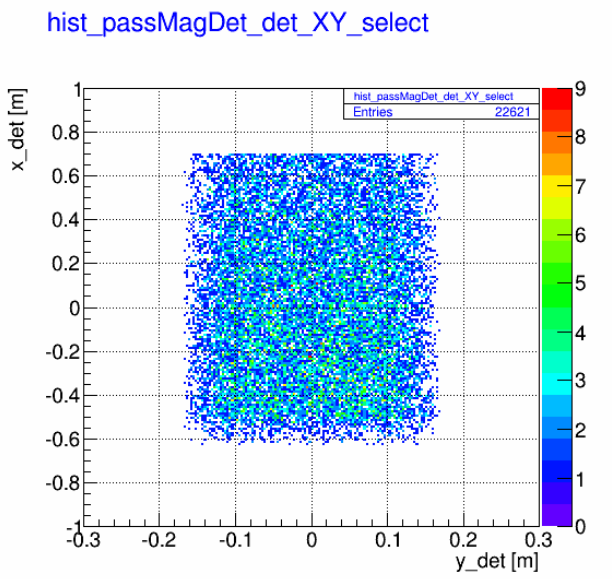
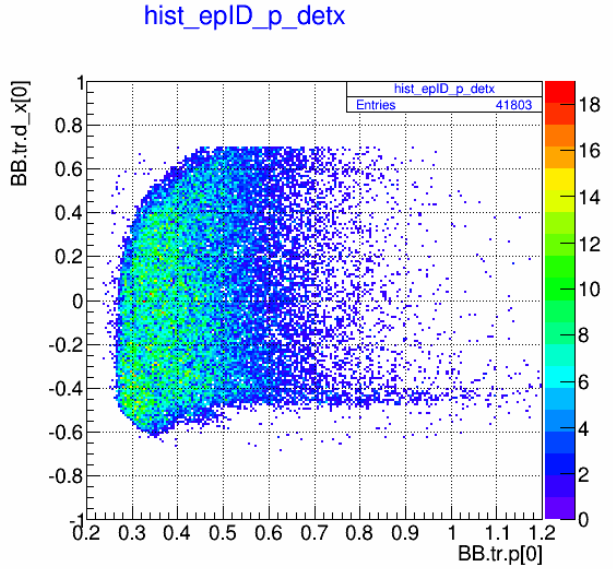
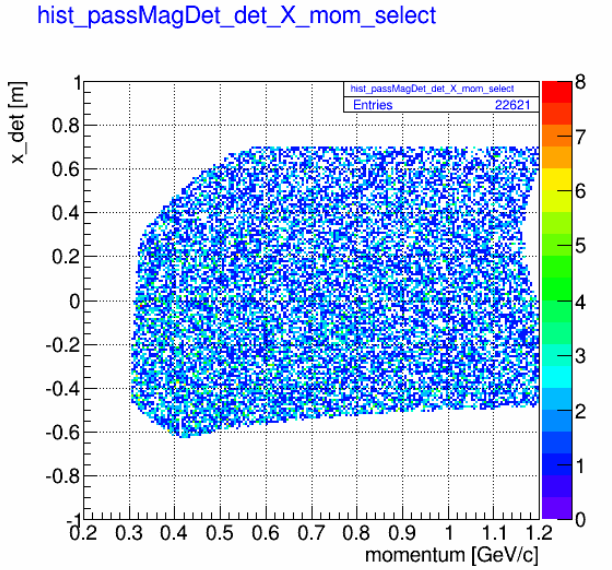
Simulation data in XZ plane. The line connecting the sample set of tracking.

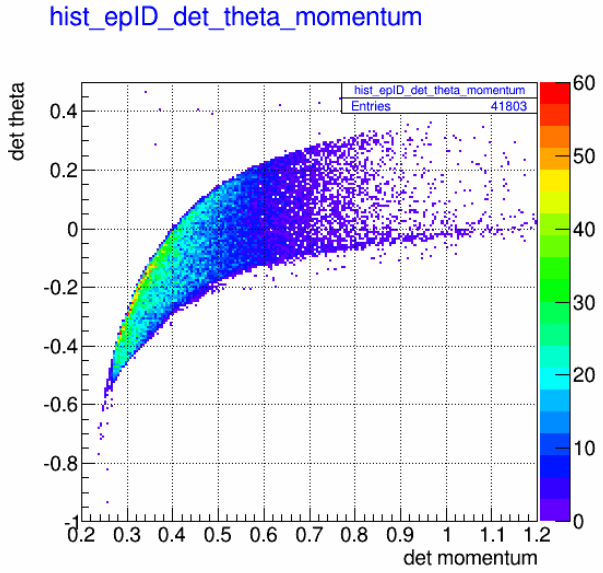
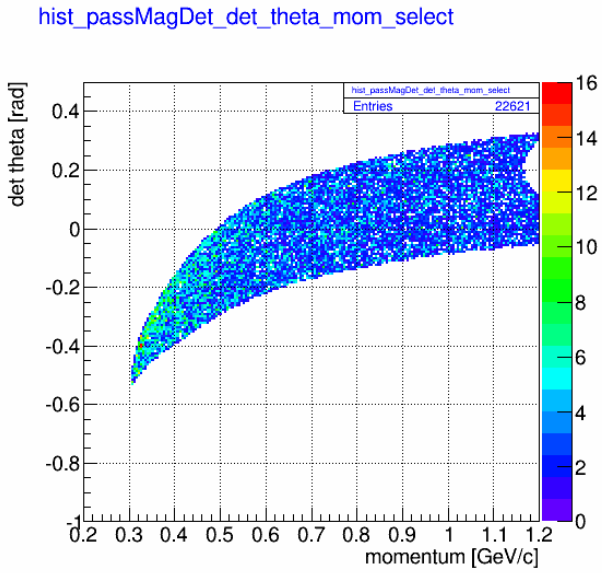
Let the target at (x,z) = (0,0)
We clearly know the location of the Collimator (first bold black line)
at z = 1.095 m and x = [-0.3475, 0.3475] m

The front of the active area and the active distance can be adjust.
In this case we set it at exactly the same as the coil of the Magnetic
at z = 1.4485 m. with The active distance from front to back (horizontally) is 0.71 m.
(or at 1.4035 m with active distance = 0.8m)

The location of MWDC1, MWDC2, and TP are known.
All at angle 25 deg (or 25.5 deg from survey)
MWDC1 center at (x,z) = (-0.4199, 2.4587) m
MWDC2 is 0.757 m from MWDC1
TP is 0.973 from MWDC1

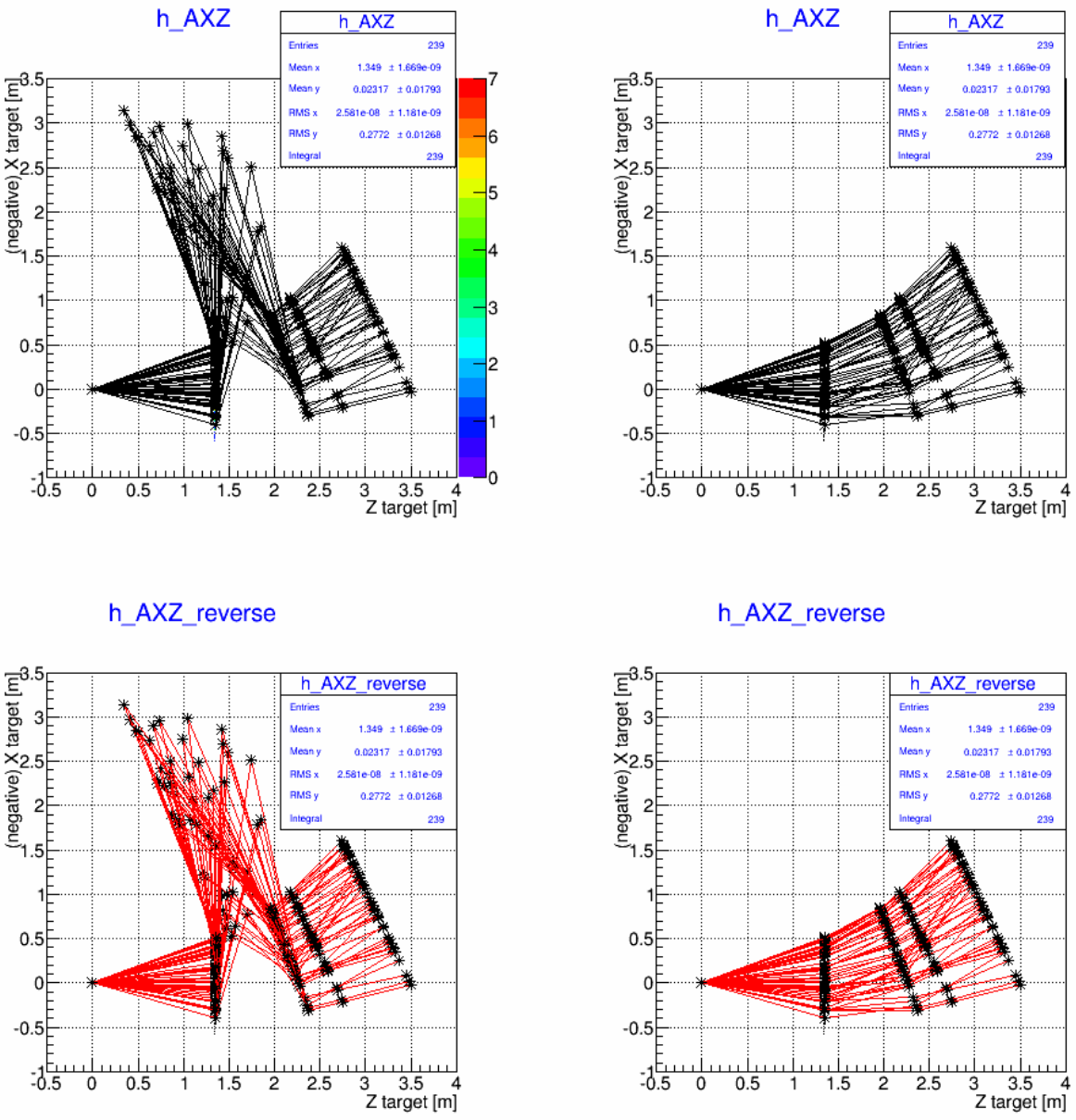
Data	Simulation
	
D1: Data (no proton PID) polygon identifying x-theta detector.	S1: The simulation of proton.
	
D2: With lose proton ID (E vs p graph cut) the proton data (in red) are within the simulation polygon area (black).	S2: we can observe & direct compare when we make the same cut in detector (x,theta)

Data	Simulation
	
D3: data with proton PID in detector (x,y)	S3: simulation with proton PID in detector (x,y)
	
D4: data with proton PID in detector (x,momentum)	S4: simulation with proton PID in detector (x,momentum)

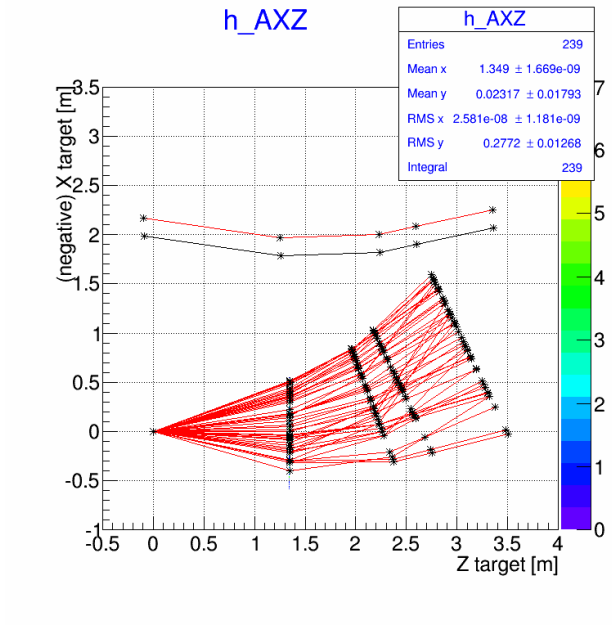
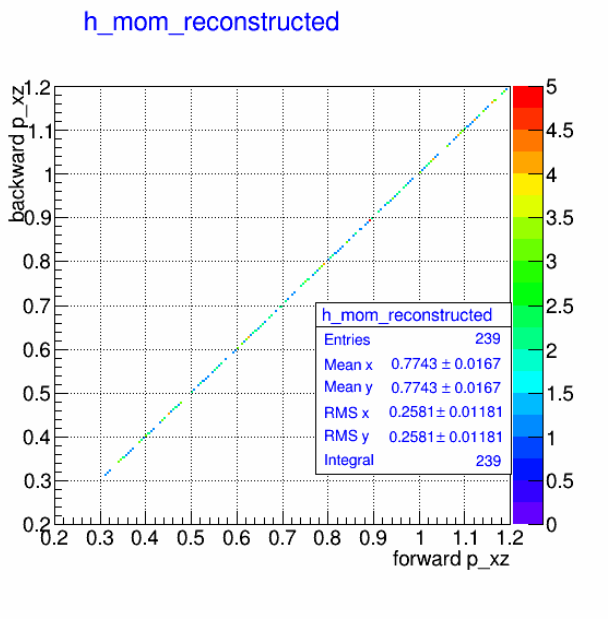
Data	Simulation
	
D5: data with proton PID in detector (theta,momentum)	S5: simulation with proton PID in detector (theta,momentum)

Testing reverse calculation.

Black line: random target (momentum,theta,phi) ->Simulation to get deterector (x,y,z,theta,phi)
Red line: reverse calculation with known detector (x,y,z,theta,phi), and expected target location at (X=0,Z=0) → Reverse Simulation to get target (momentum, theta,phi).



Left side: (include the vertex of rotation)
Right side: passage tracing
Top: from target ->Detector
Bottom: from Detector->Target

	
Overlap of front->back (black) & back to front (red) One passage separated to show the angle without overlay.	Compare the momentum in XZ plane. The forward p ->cal R The backward cal R->cal p