IP8 Far-Forward Study

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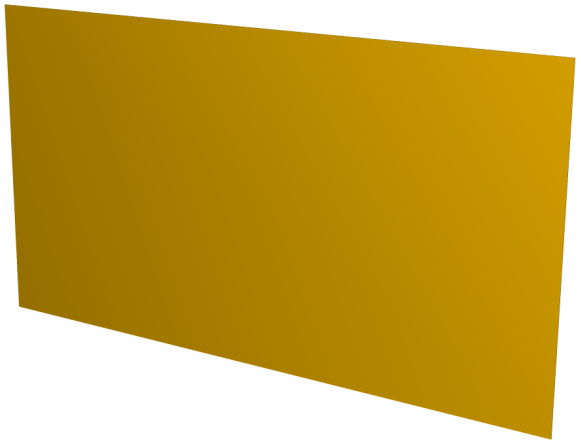
Simulation

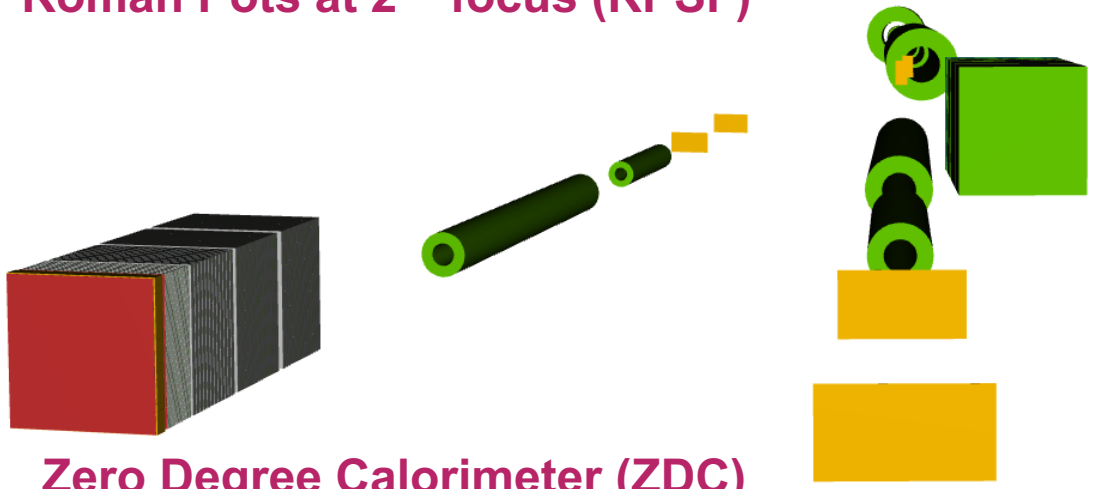
- Convert BeAGLE ePb 18×110 GeV incoherent diffractive J/ψ events into IP8 using afterburner
- Examine veto efficiency by checking any hits in OMD/ZDC/RP

- At the moment, I have a couple of things to understand what's going on.

Roman Pots at Secondary Focus



Roman Pots at 2nd focus (RPSF)



Zero Degree Calorimeter (ZDC)

Roman Pot at Secondary Focus (RPSF)
- Implemented one layer of silicon at each station
- Dimension of 14 cm tall and 26 cm wide
- Placed at (x,z) =
  (1.1727m, 44m) and (1.18806m, 45.5m)

Secondary Focus at (x,z) =
(1.185861402, 45.43631007)

Based on IP6_STAR and EIC CDR table 3.3

Sigma ~ sqrt(emittance * Beta(z) + D*deltaP/p)

where Beta(z) beta function
D dispersion
DeltaP/p beam momentum spread

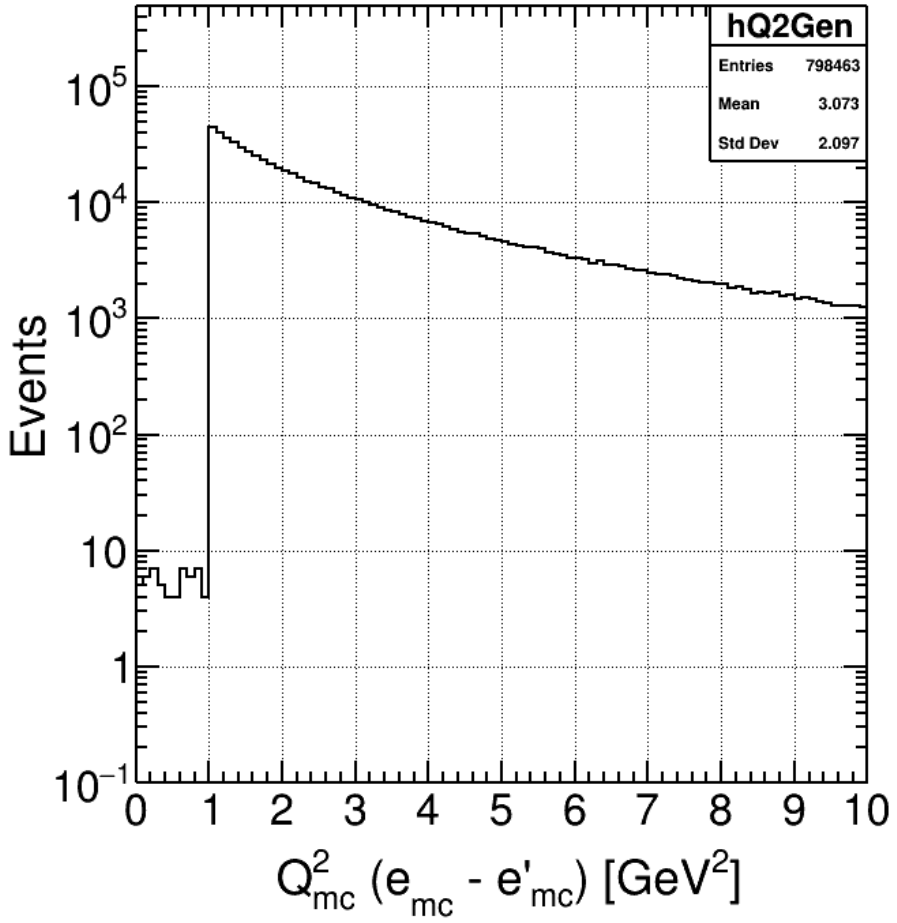
10 sigma R_{cut} defined as safe distance (slit size)

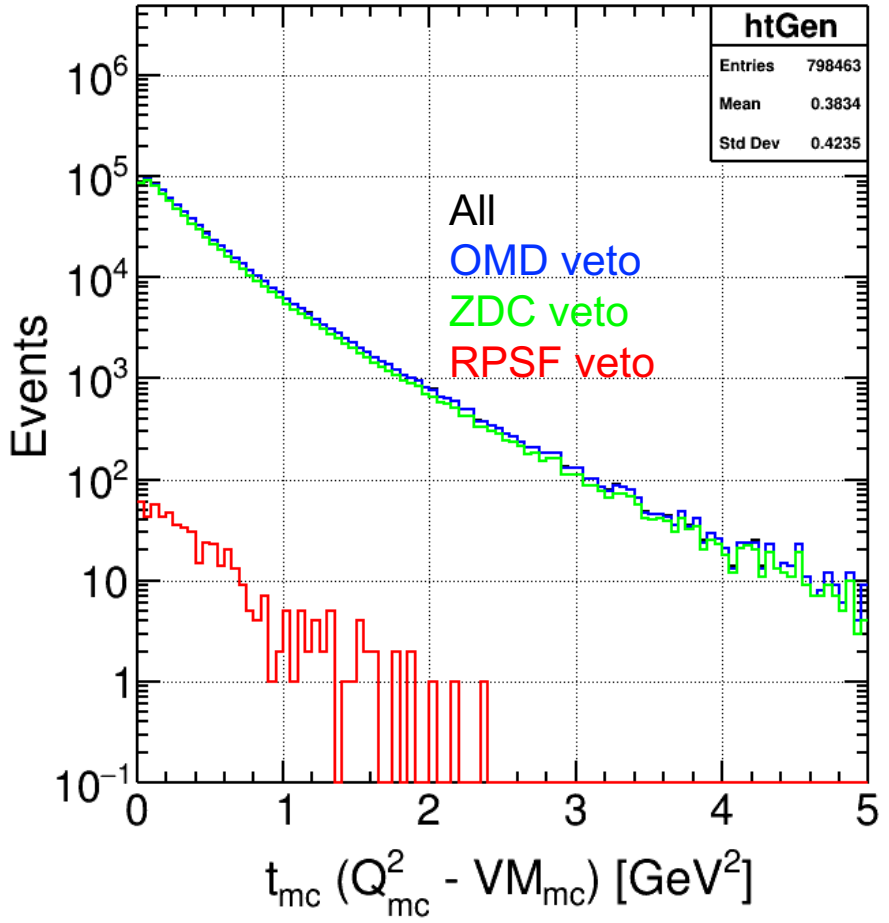
Gaussian beam profile: sigma in x: 0.286139 mm
Gaussian beam profile: sigma in y: 0.259979 mm
1 sigma in xy: 0.386606

Q^2 and t distribution

BeAGLE 18x110 GeV^2
Incoherent events
$ePb \rightarrow J/\psi(\mu\mu)$

Q) ZDC doesn't veto
Q) Nuclear breakups in Roman Pot at secondary focus





Nuclear Breakups Distribution

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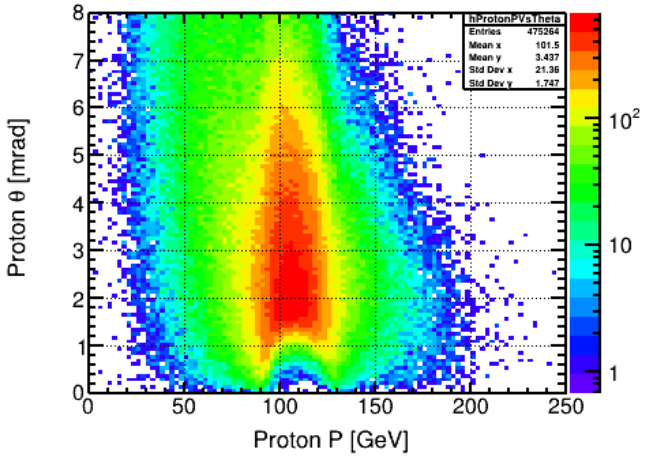

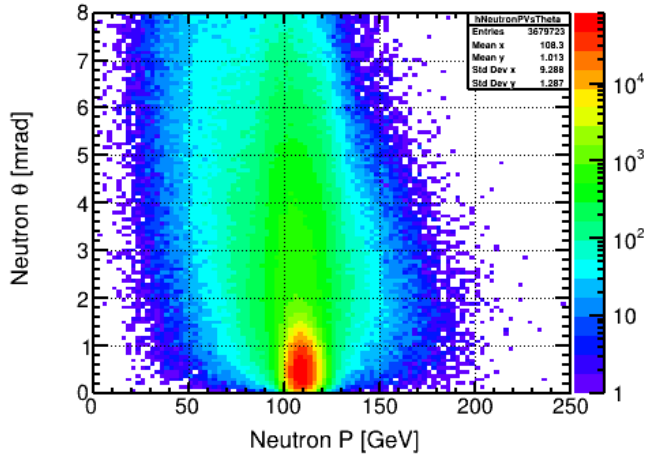

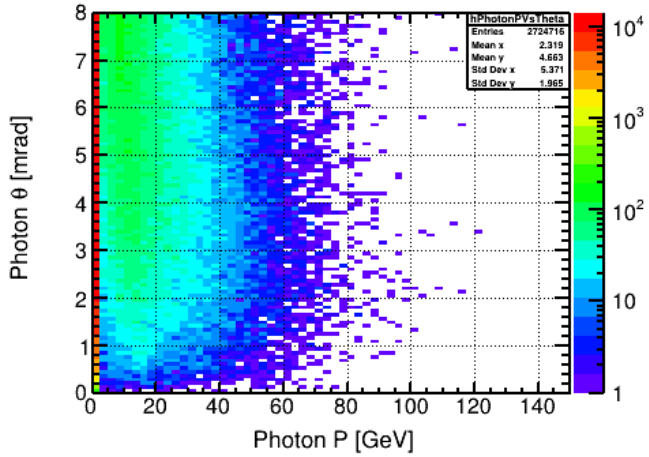

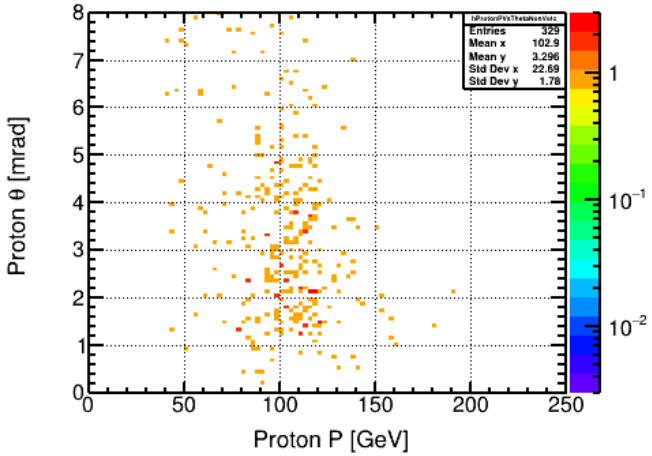

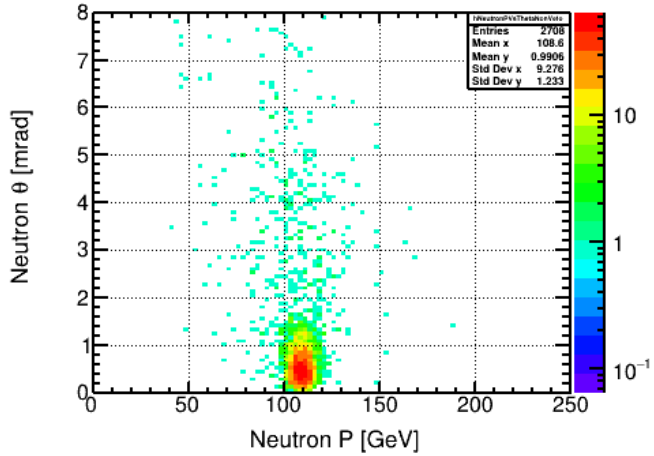

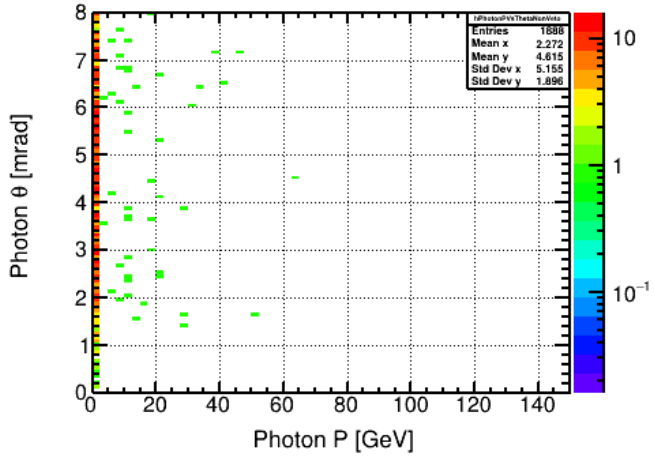

Hit Positions w/o events in slit

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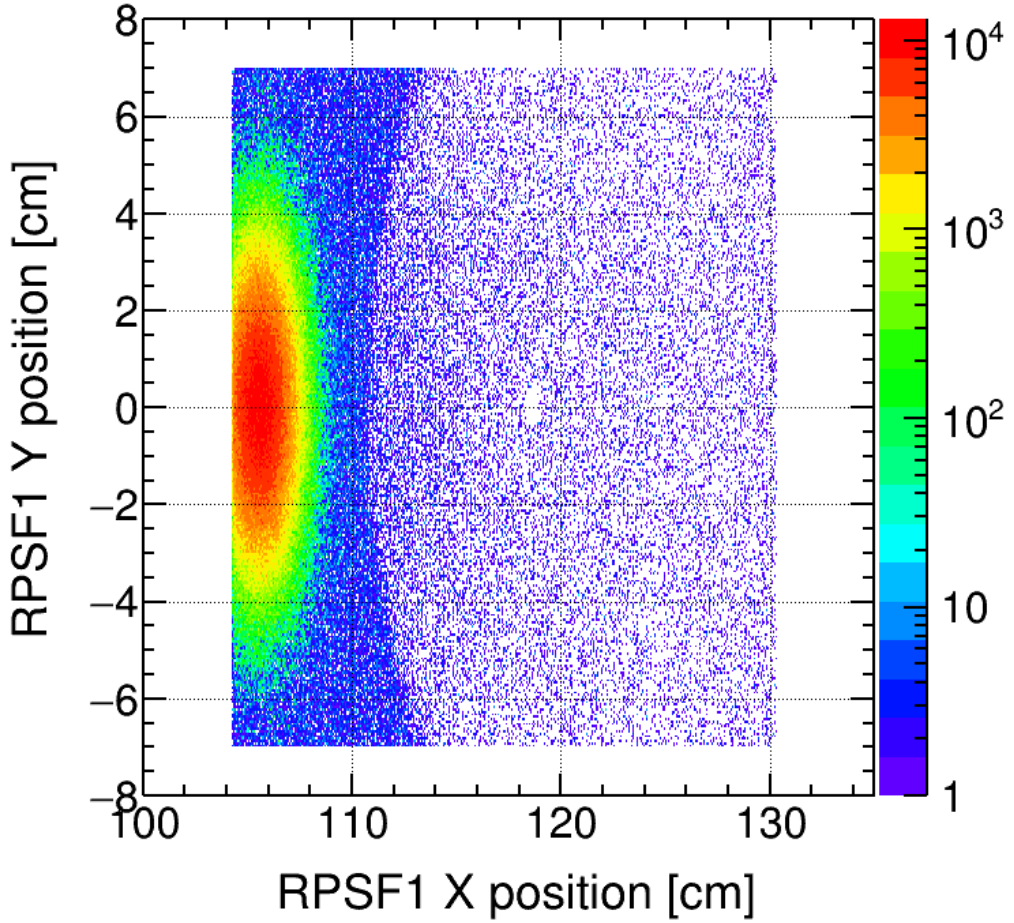

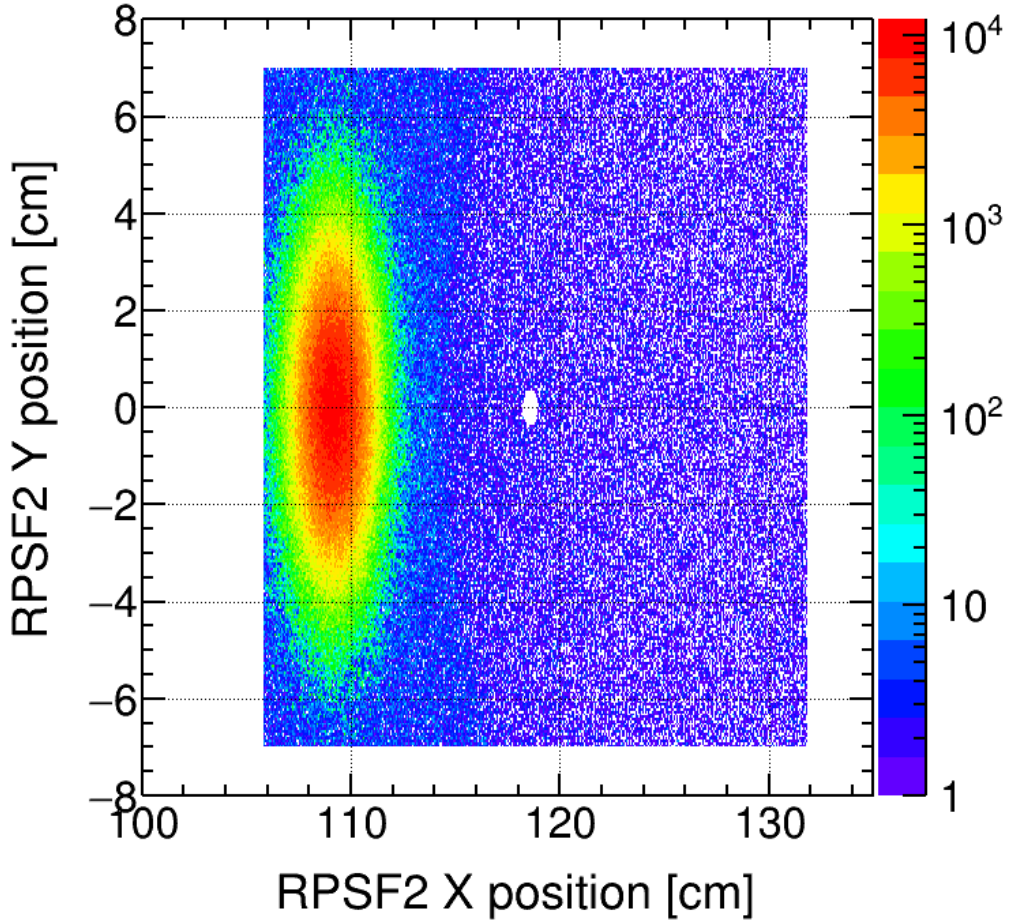

Neutron Distribution

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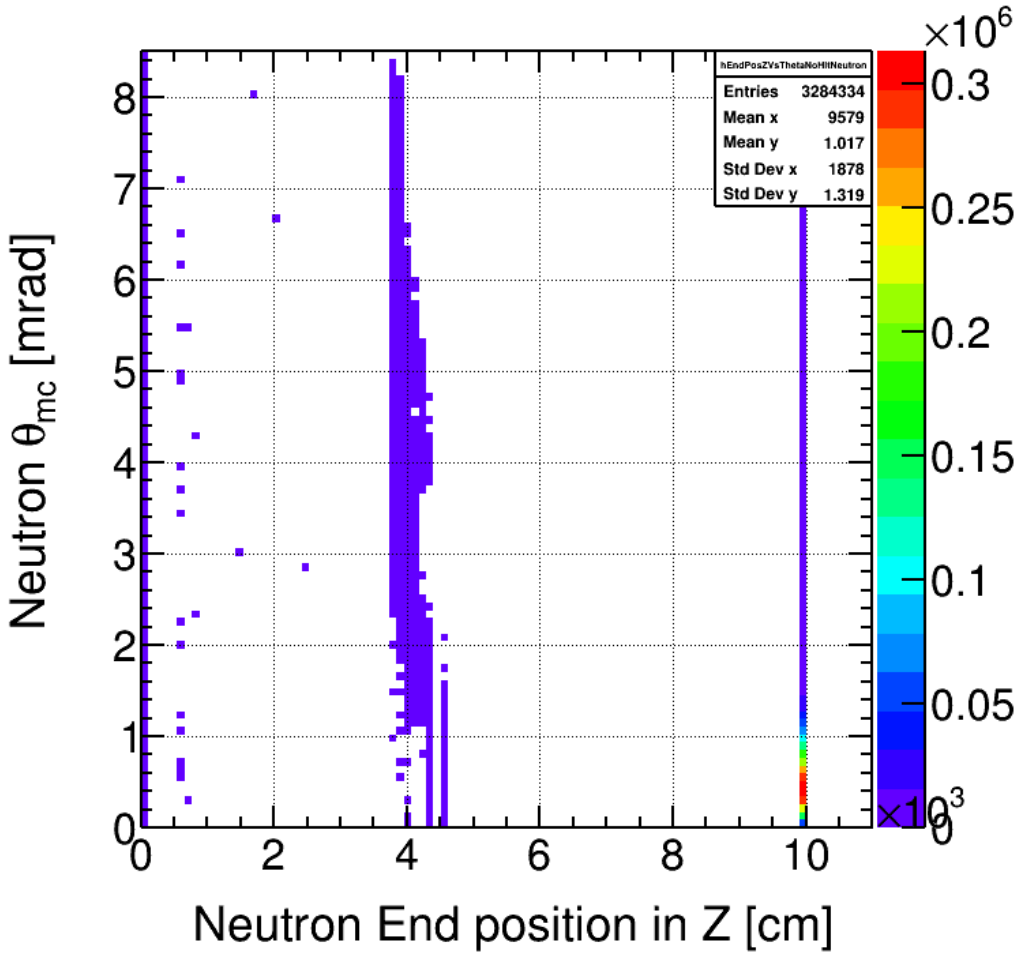
$ePb \rightarrow J/\psi(\mu\mu)$



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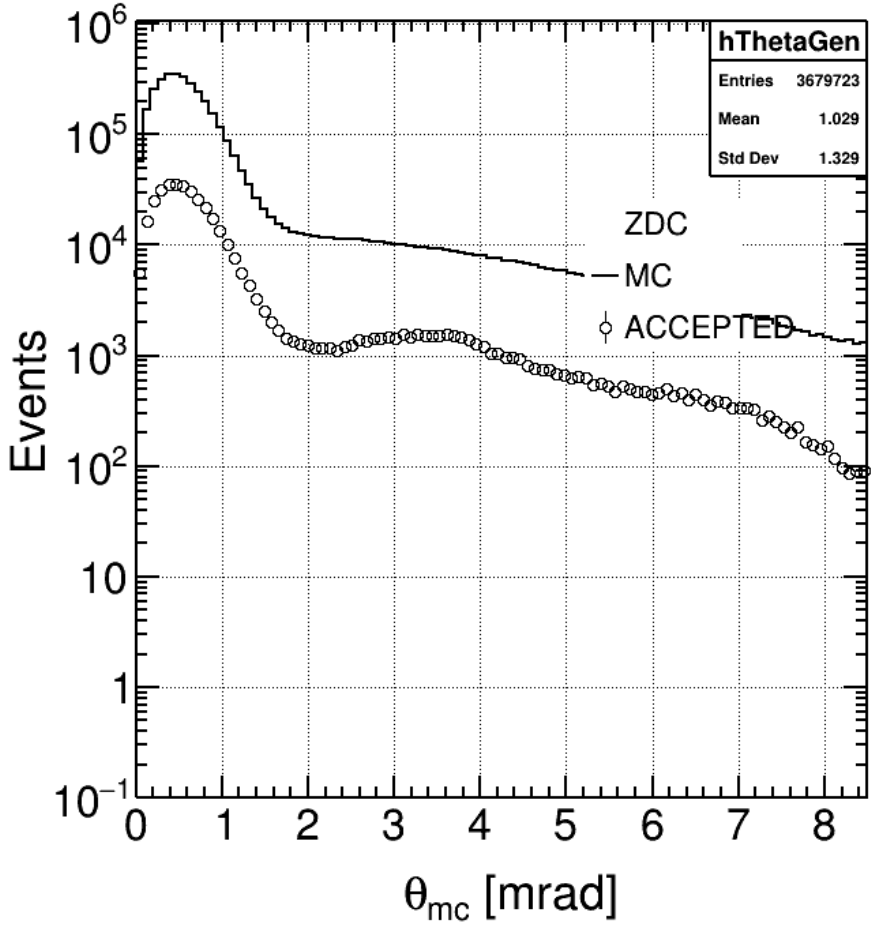

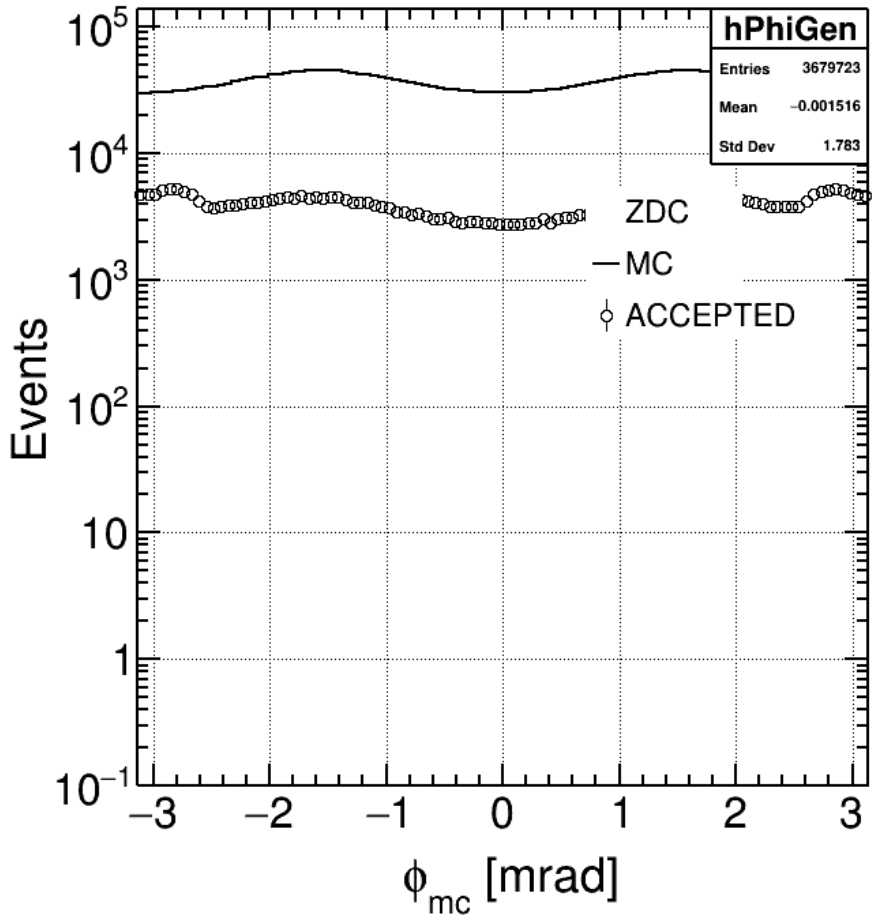

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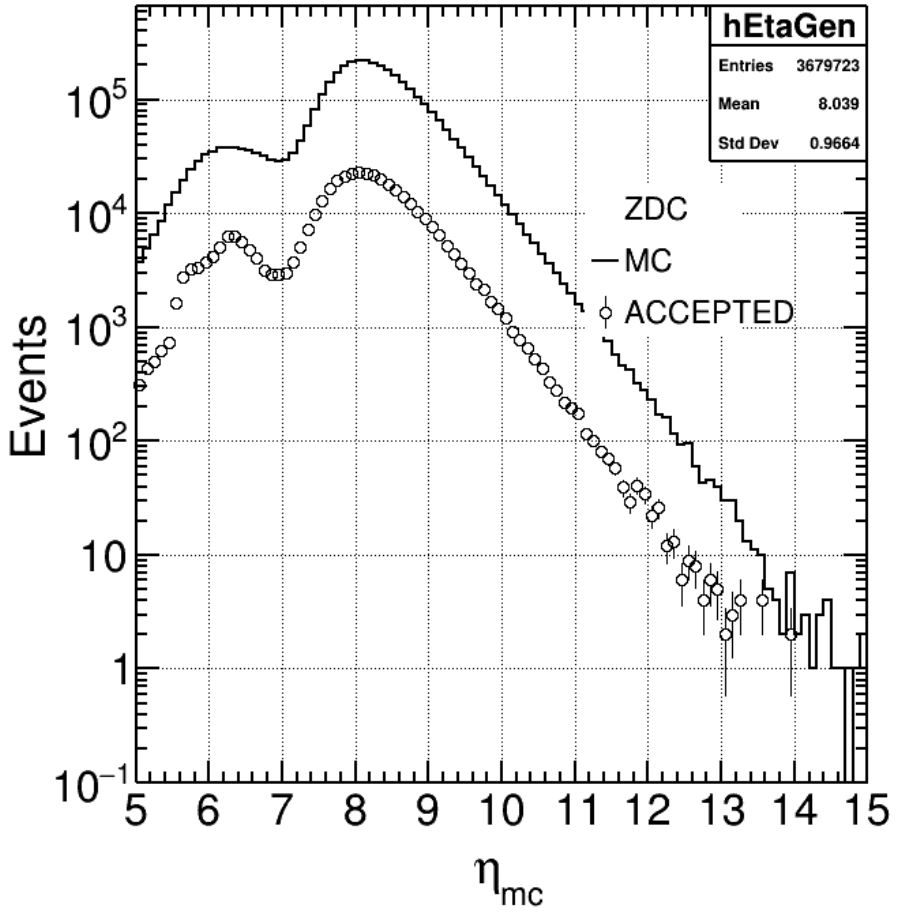

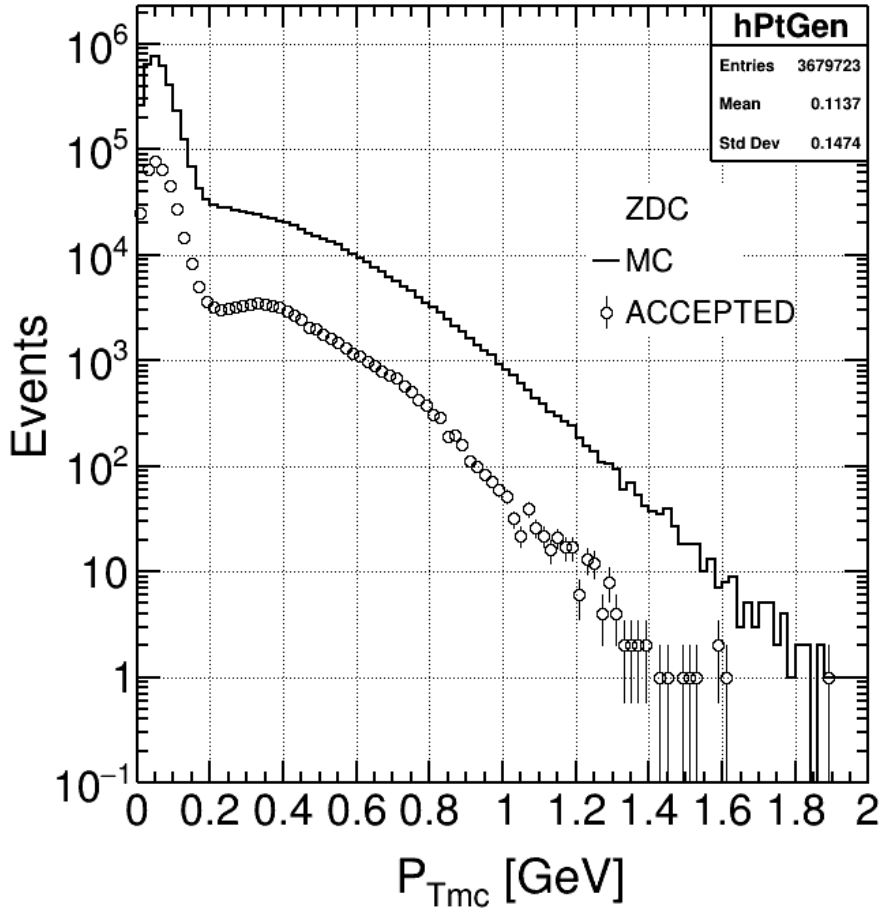

Summary and Next Stpes

- Observed neutrons not interacting with ZDC
- Observed some offset in Roman Pot at Secondary Focus

- From last week's acceptance, ZDC has good acceptance using 5 mrad thrown distribution. Single particle makes sense.
- **Possibly something wrong in afterburner when apply crossing angle and beam effects. Double-check converting input files to IP8 setting**