Update on D(e,e'p)n

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Kinematics

$E_{\text{Beam}} = 10.6$ GeV

I. Hydrogen Elastics, H(e,e'p)

Electron kinematics

$Q^2 = 4.026$ GeV^2

$P'_e = 8.454$ GeV/c

$\theta_e = 12.169^o$

Proton kinematics

$P_p = 2.938$ GeV/c

$\theta_p = 37.339^o$

Run Plan:

The settings to be investigated will be set in the Following order:

-Run Hydrogen Elastic (I.)
-Run Deuteron at low missing momentum (II.)
-Run Deuteron at high missing momentum (III., IV., V)

NOTE: When setting spectrometer central momentum, One should go from higher to lower settings to avoid magnetic hysteresis. In our current configuration, the scattered electron momentum goes from low (hydrogen elastics) to High (deuteron), therefore, we must find a common setting that has small effects on the acceptance.

Deuteron, D(e,e'p)n

Electron kinematics

$Q^2 = 4.25$ GeV^2

$P'_e = 8.922$ GeV/c

$\theta_e = 12.169^o$

Proton kinematics

II. @ Pmiss = 80 MeV

$P_p = 2.435$ GeV/c

$\theta_p = 40.061^o$

III. @ Pmiss = 500 MeV

$P_p = 2.305$ GeV/c

$\theta_p = 53.252$

IV. @ Pmiss = 650 MeV

$P_p = 2.220$ GeV/c

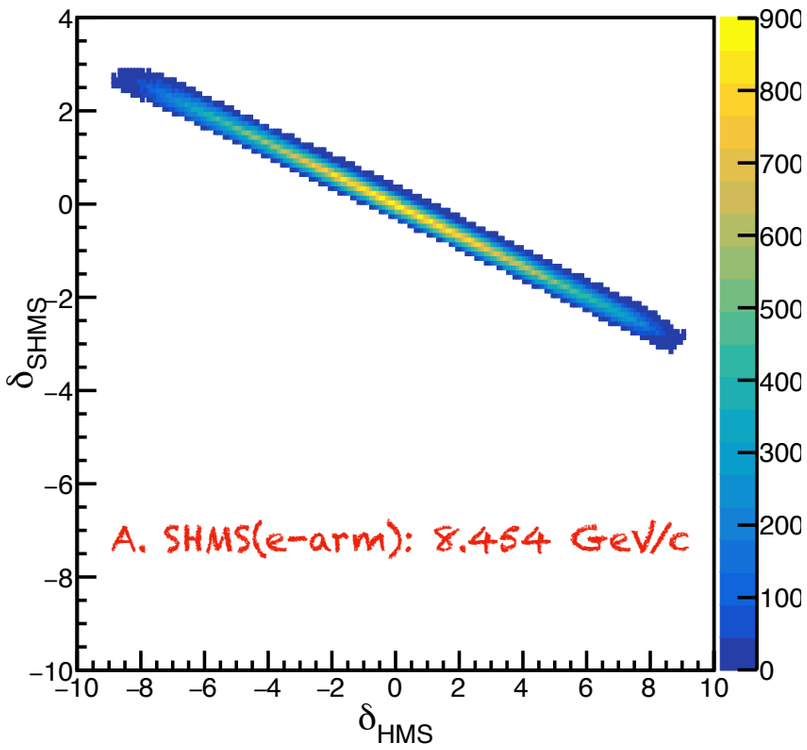
$\theta_p = 56.401$

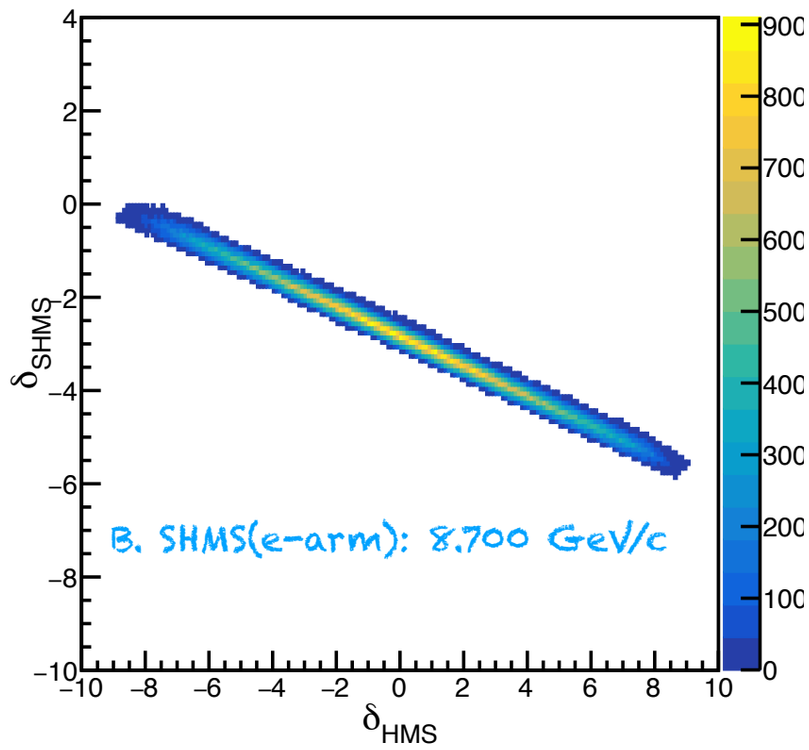
V. @ Pmiss = 800 MeV

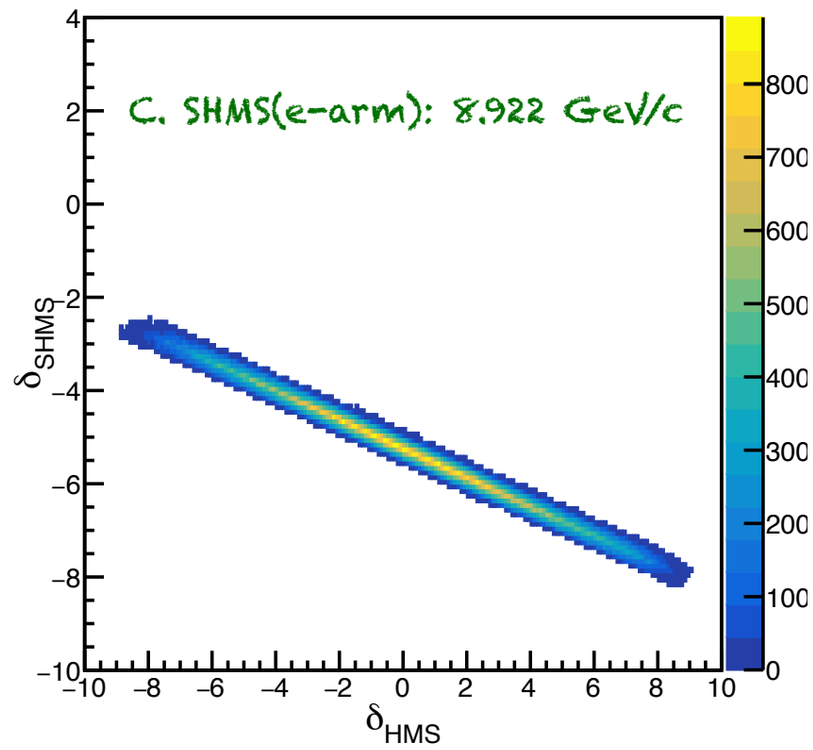
$P_p = 2.120$ GeV/c

$\theta_p = 59.388$

Hydrogen Elastics Simulation







During the simulation, ONLY the SHMS central momentum was varied.

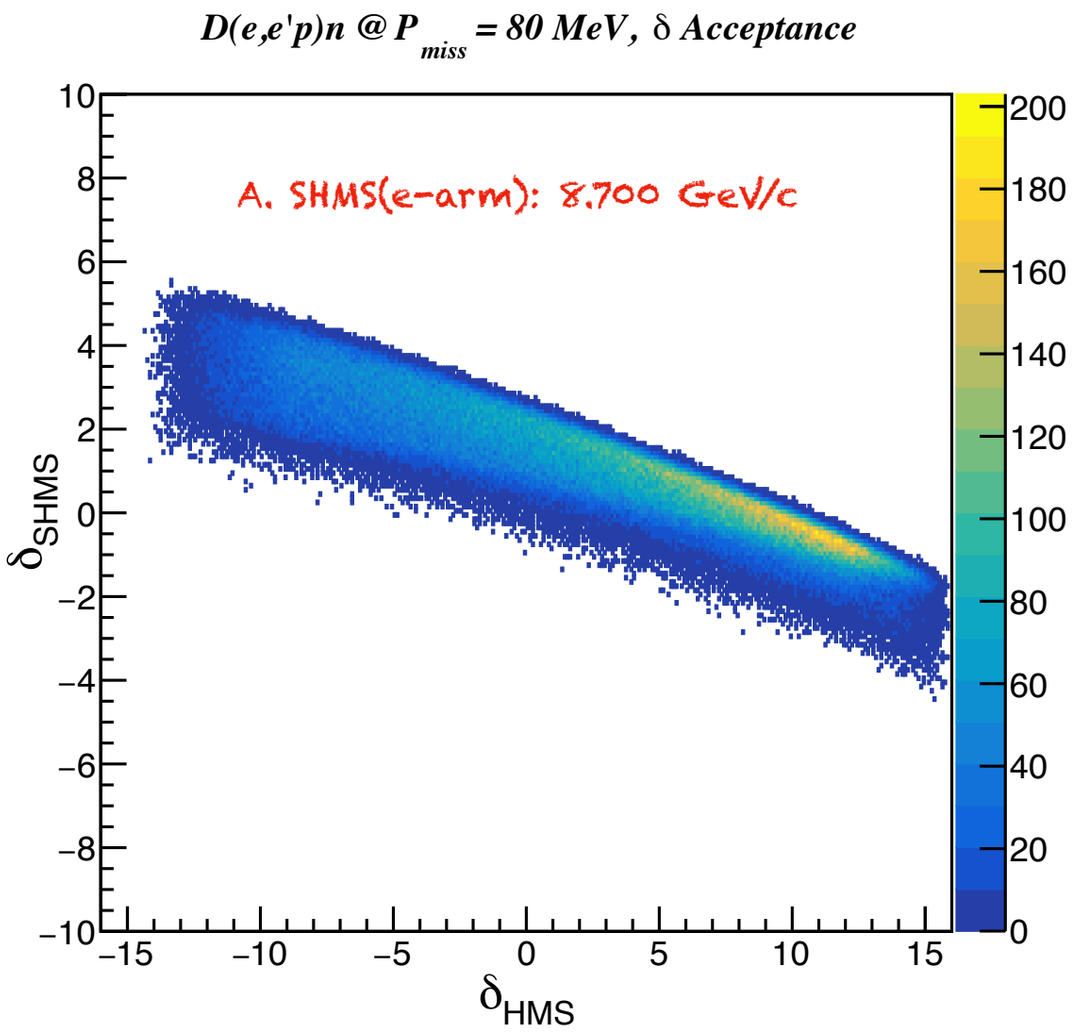
A. Original hydrogen elastics kinematic settings. Most 'e-p' coincidence events fall at the center of the acceptance

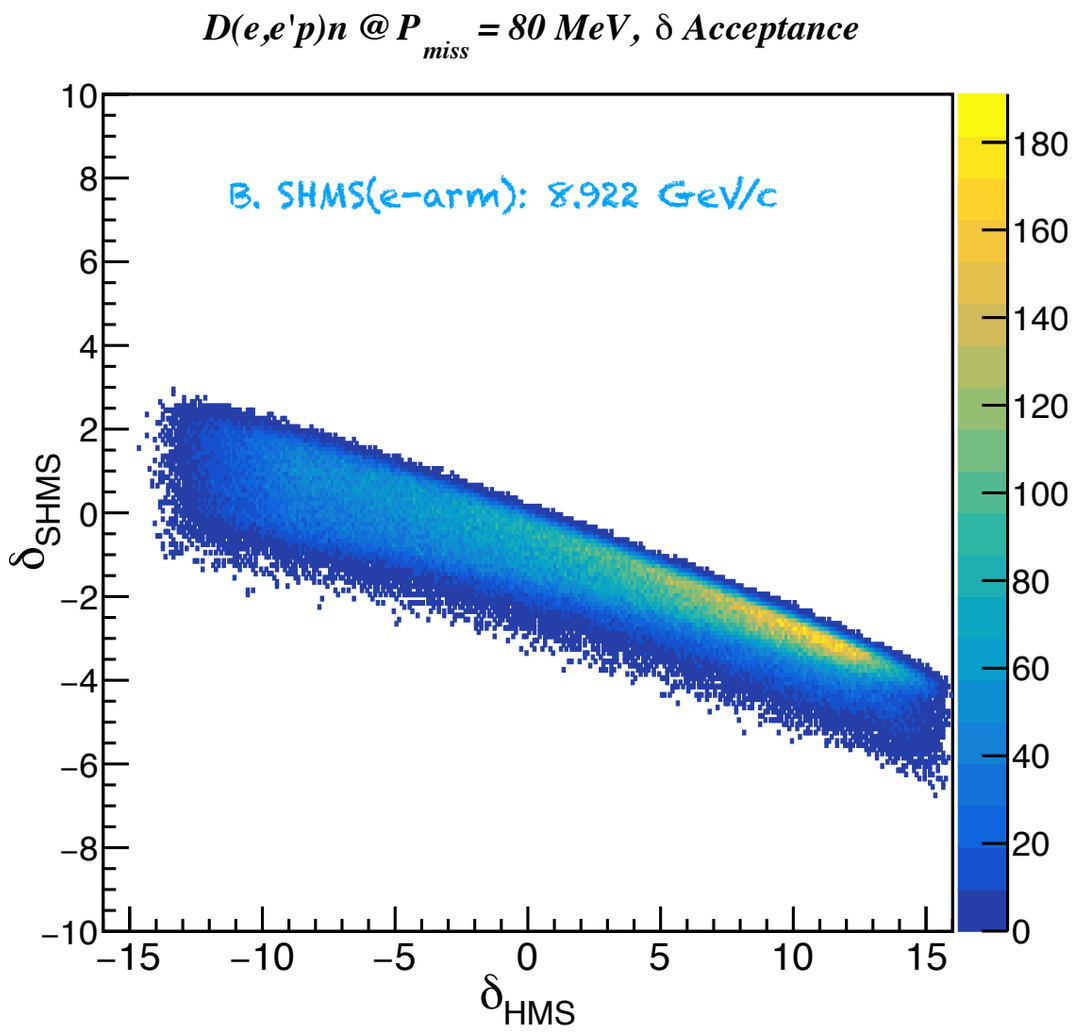
B. Most 'e-p' coincidence events shifted by about -3% in the SHMS acceptance

C. SHMS central momentum same as D(e,e'p). Most 'e-p' coincidence events shifted by about -5% in the SHMS acceptance

Comments: Mark suggested to set SHMS central momentum to 8.7 GeV/c, since at 8.922, We were approaching the edge of the SHMS acceptance (-10%)

D(e,e'p)n Low Missing Momentum Simulation





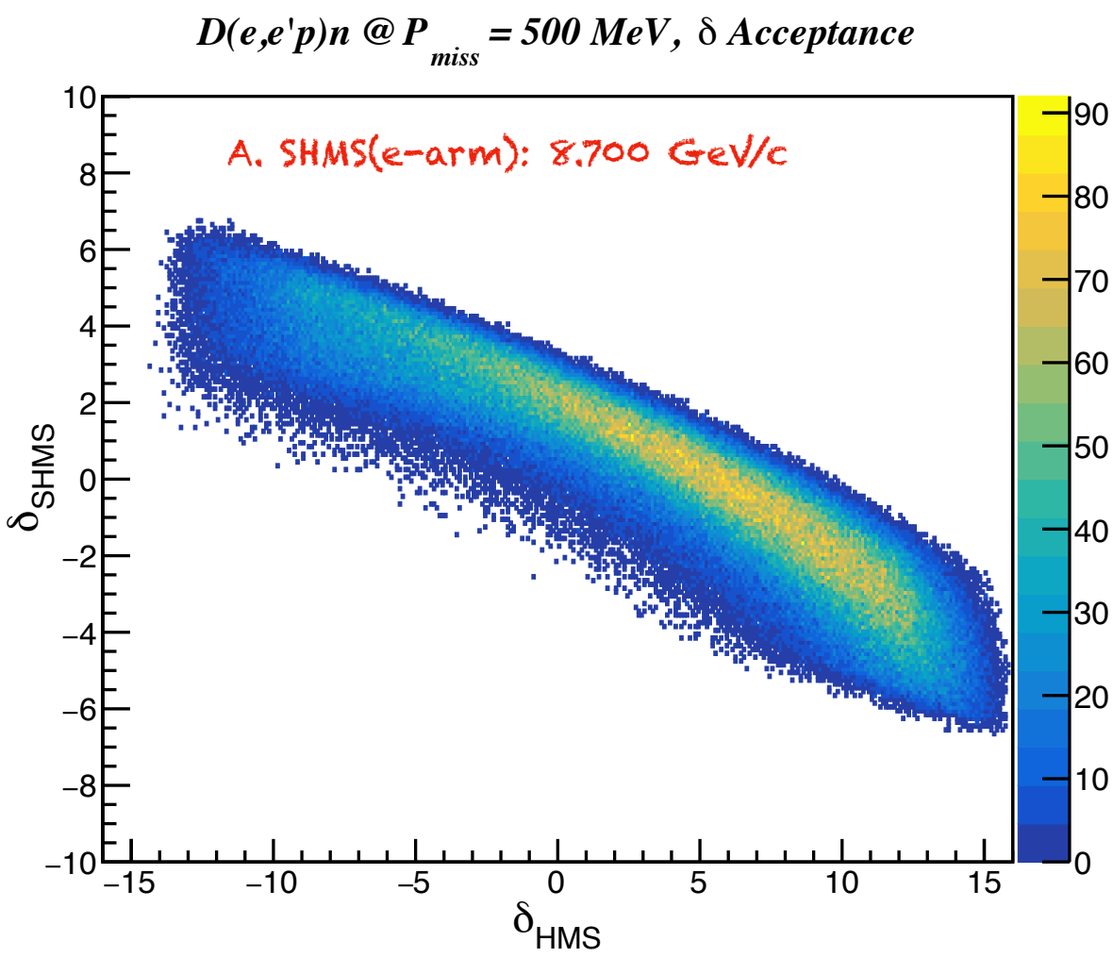
During the simulation, ONLY the SHMS central momentum was varied.

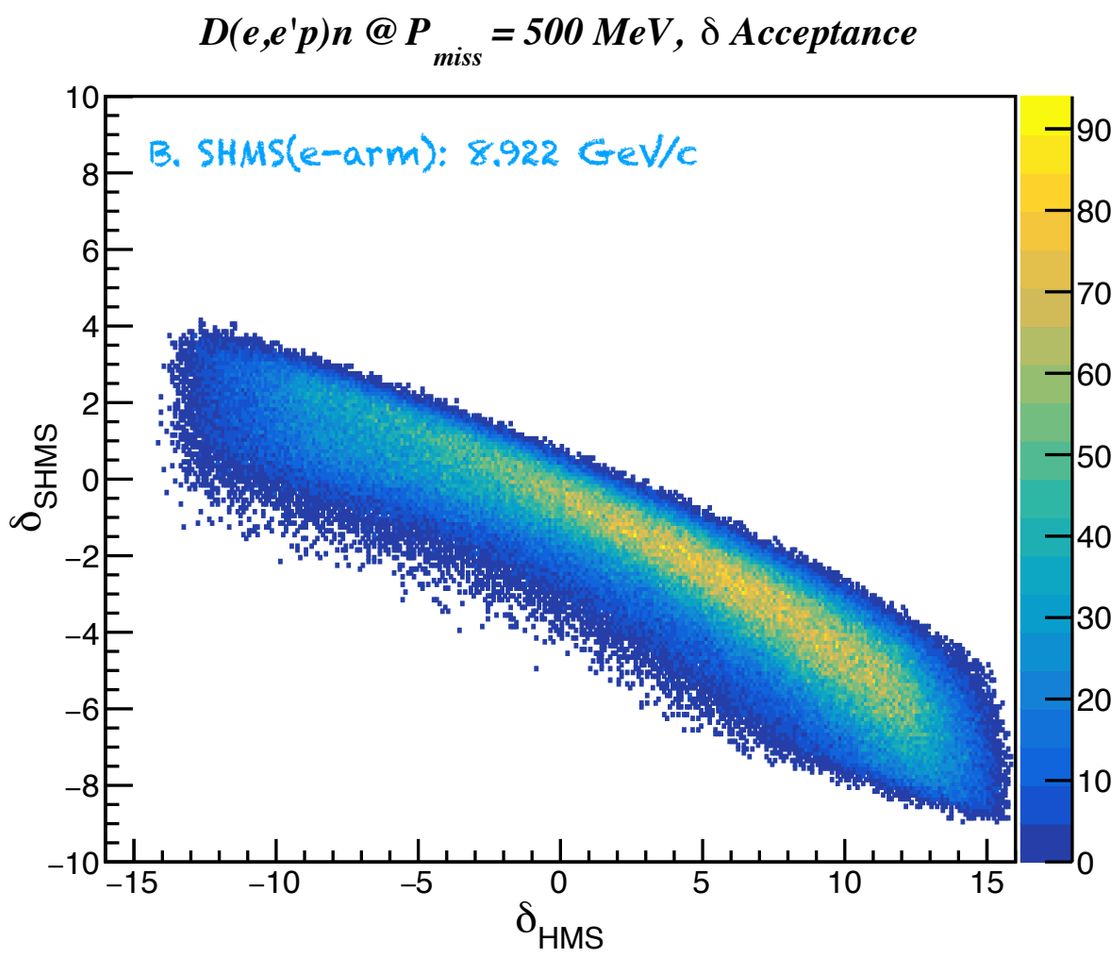
A. Most 'e-p' coincidence events fall around the center of the SHMS acceptance

B. Original Setting. Most 'e-p' coincidence events shifted by about -2% in the SHMS acceptance

Comments: Setting the SHMS at a lower (8.7) than nominal (8.922) central momentum actually improves the Acceptance region of events, since it shifted them more towards the center of The acceptance

D(e,e'p)n High Missing Momentum Simulation





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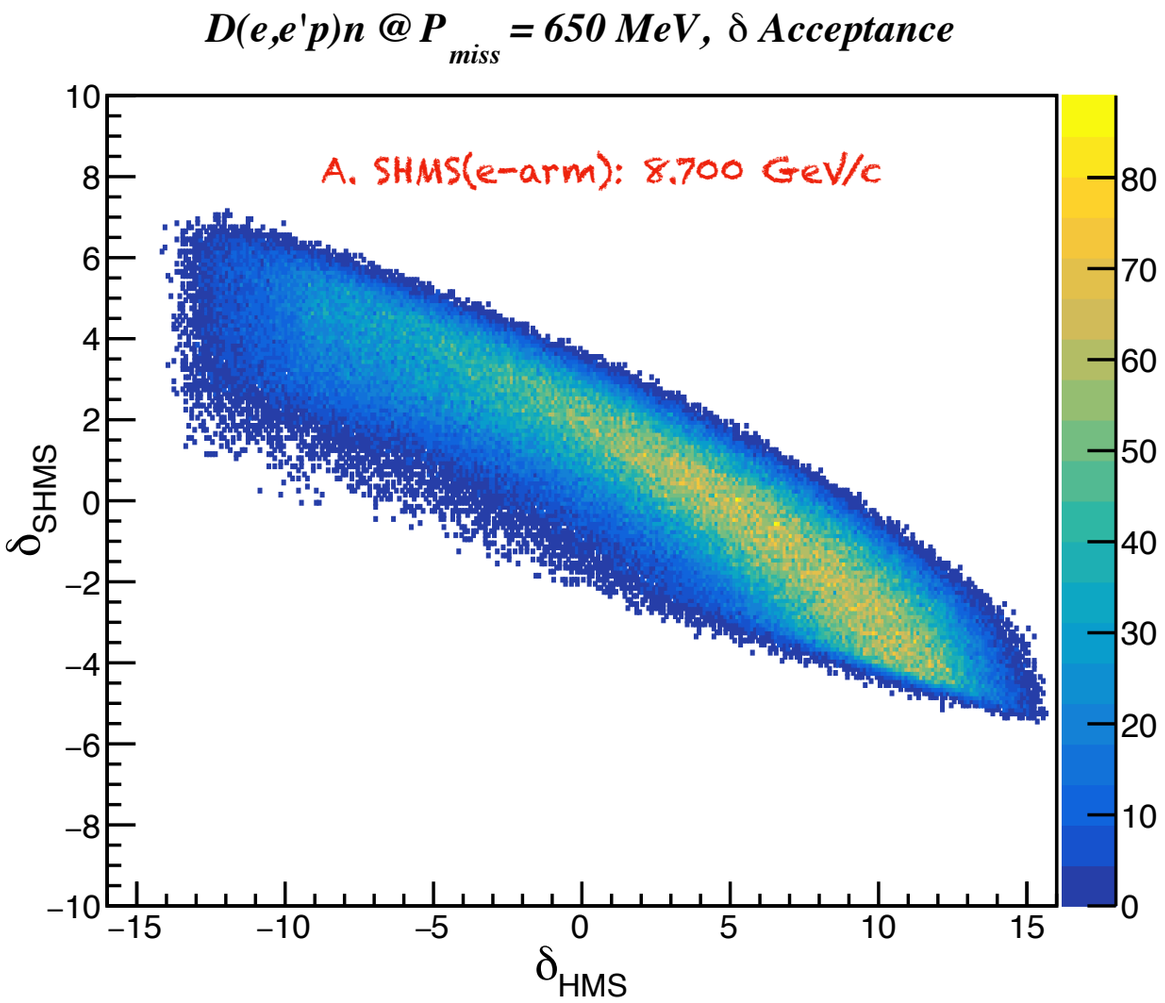
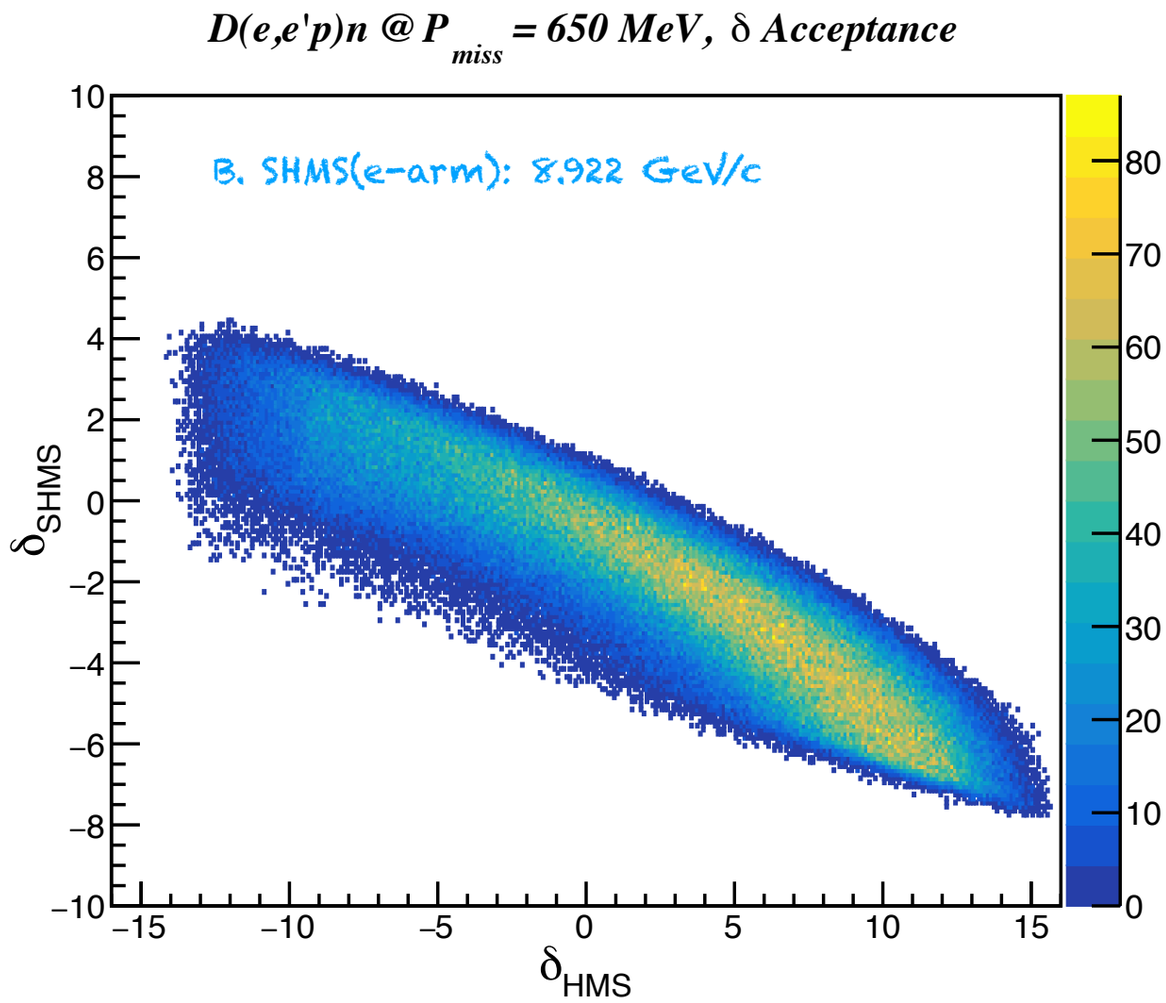
D(e,e'p)n High Missing Momentum Simulation





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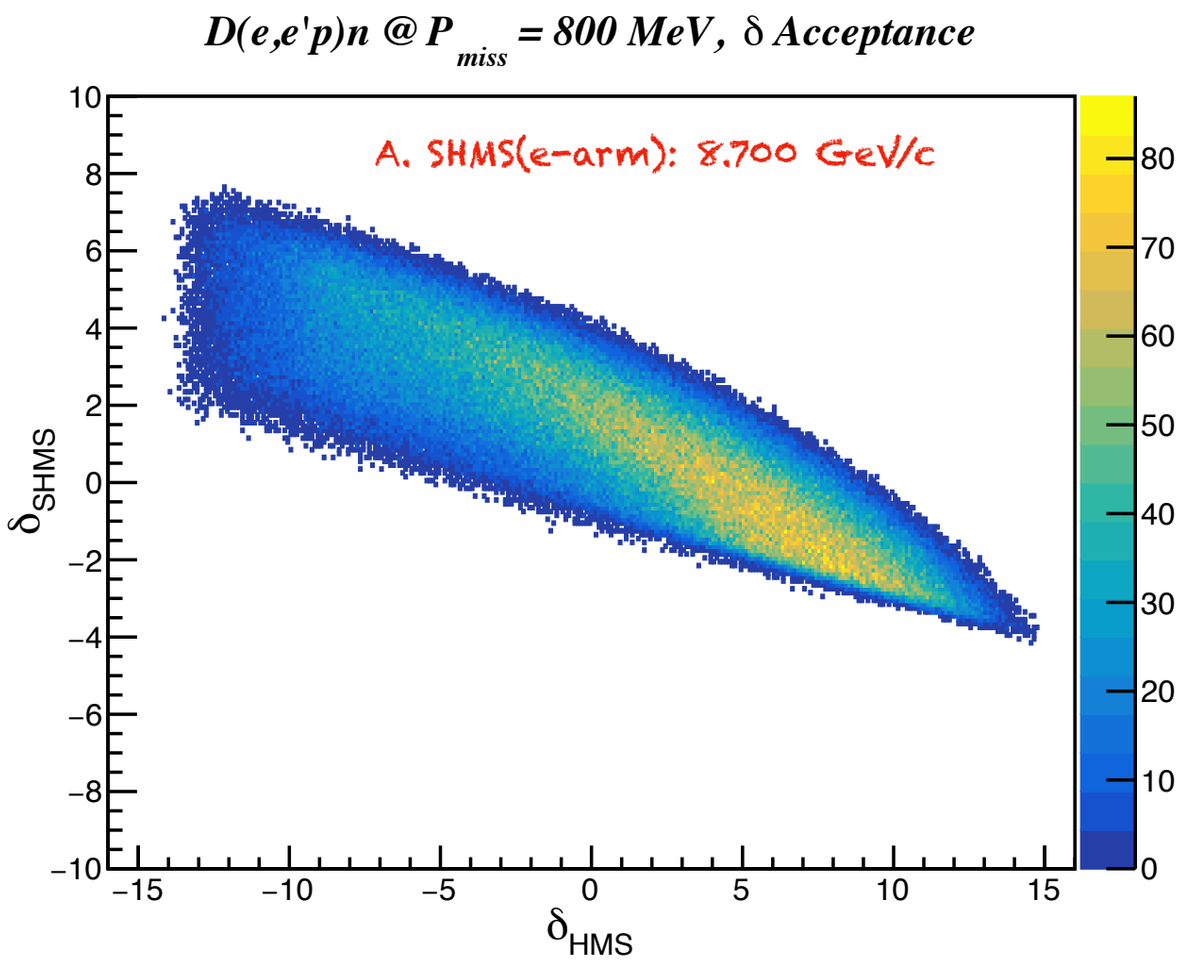

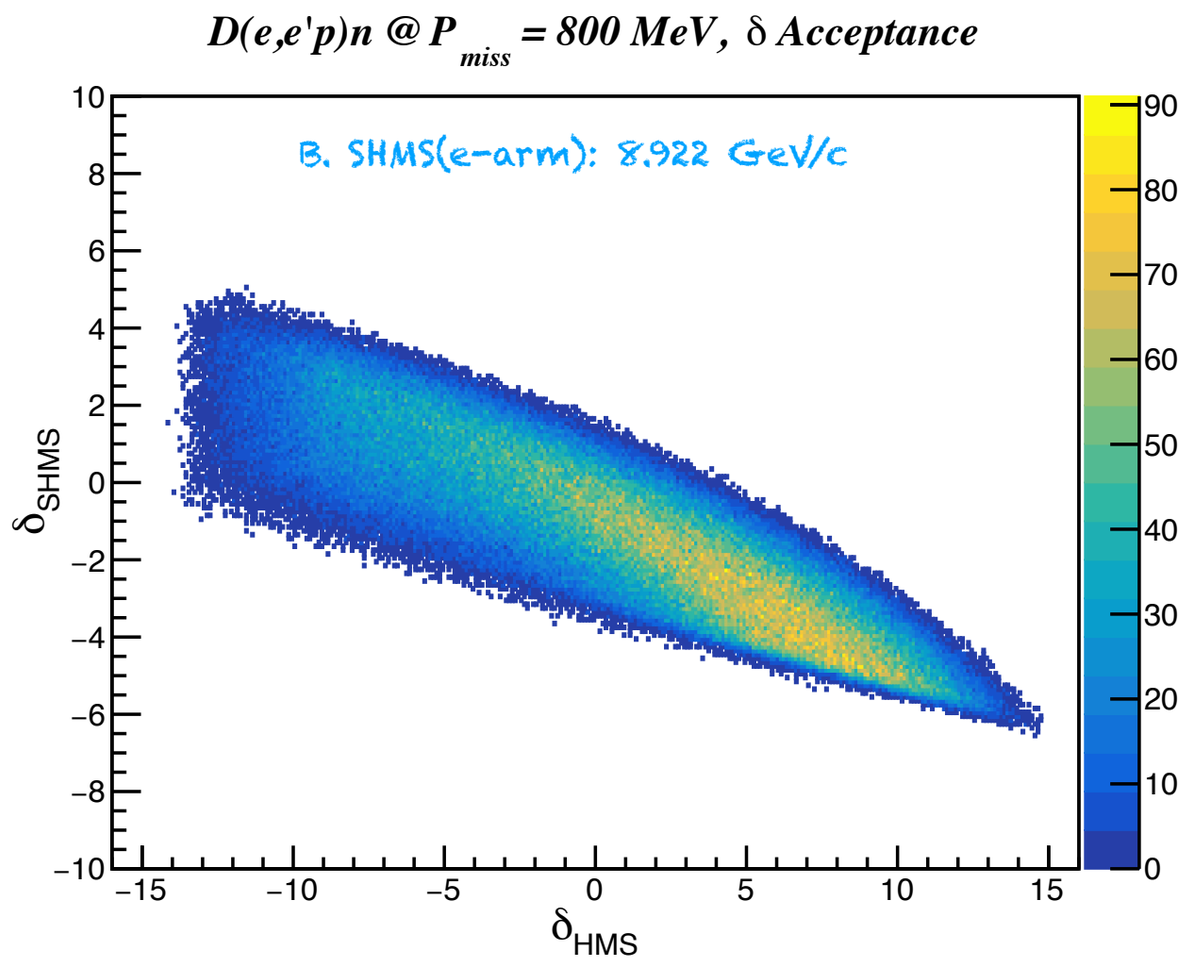

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Summary of Simulation Results

- The SHMS acceptance for hydrogen elastics shifts from the center towards an edge with increasing electron central momentum.

- The SHMS acceptance for the Deuteron D(e,e'p)n at low and high missing momenta seems to shift toward the center as the SHMS central momentum is decreased from its original setting (8.922 GeV/c) to the 8.7 GeV/c, which is actually an improvement, since the best understood region of the SHMS acceptance is around the center.

- In conclusion, it seems that a central momentum setting of 8.700 GeV/c is the best option, as it shifts the acceptance of D(e,e'p)n towards the center, and it does NOT shift the acceptance for hydrogen elastics that far to the edge.