Check Impact of ZDC acceptance in terms of eA centrality

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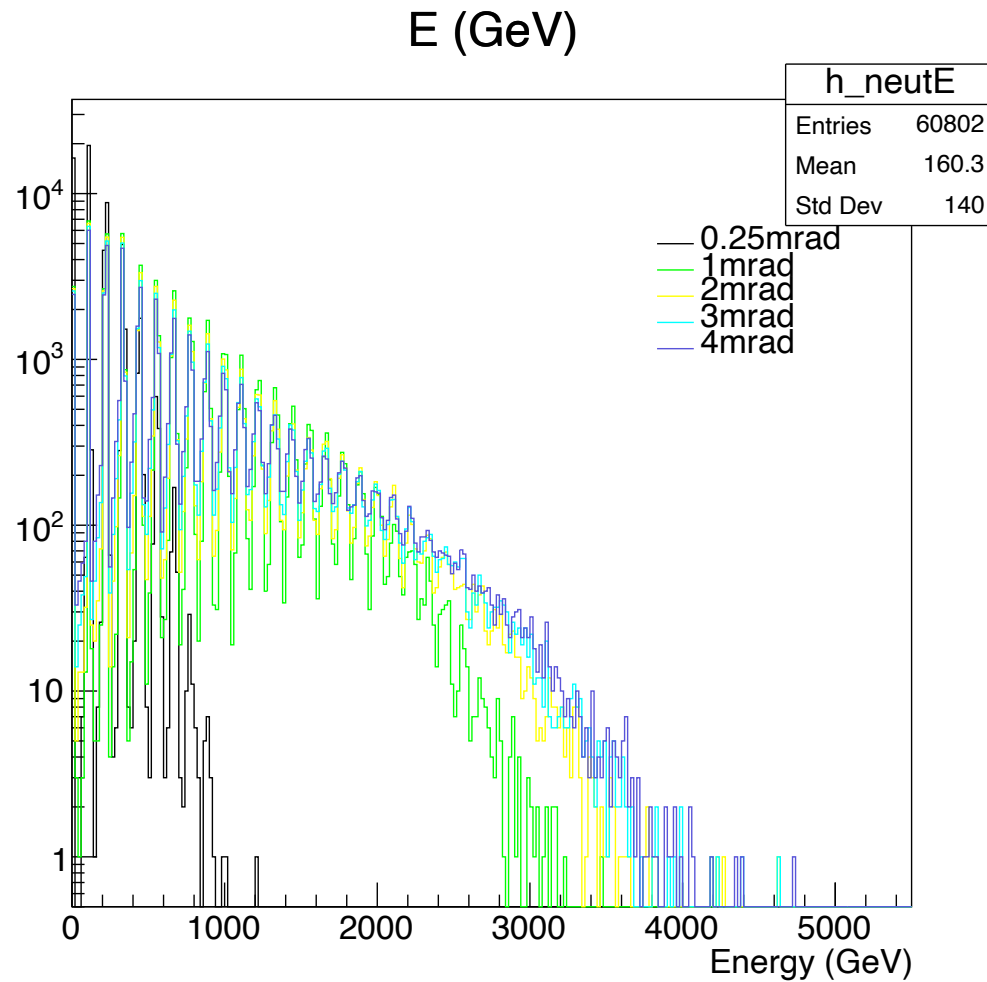BNL

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BeAGLE simulation
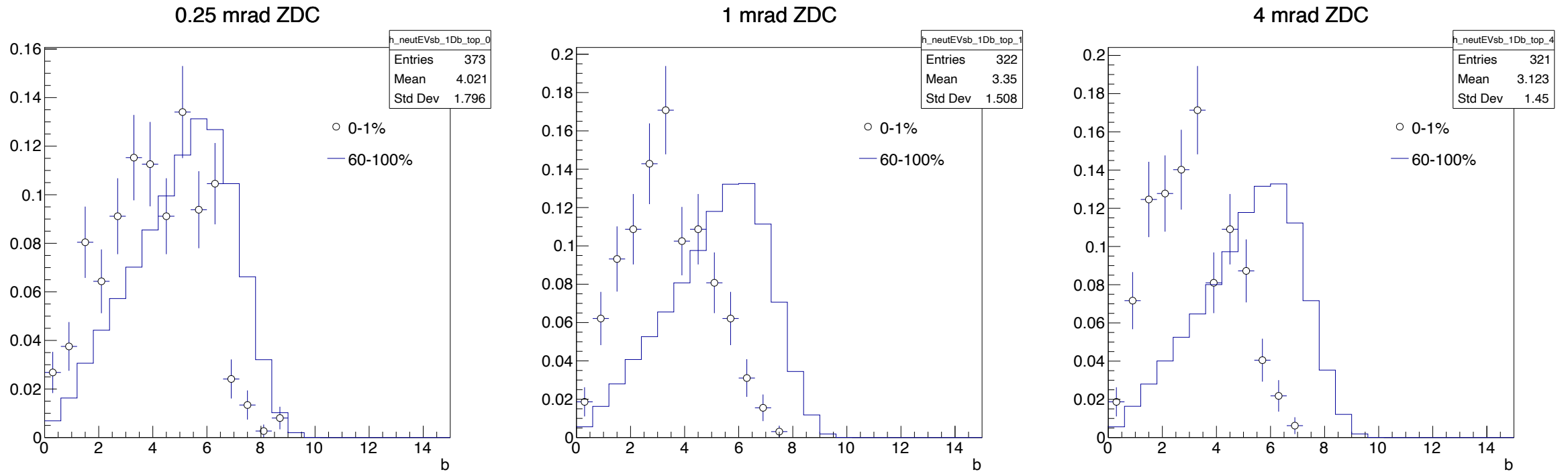
- Updated BeAGLE, w.r.t https://arxiv.org/pdf/2204.11998 (but evaporation neutrons didn't change much.)

- 18x110 GeV ePb collisions, with Q2>1, 0.01<y<0.95. 100k events.

- ZDC acceptances are checked: 0.25, 1,2,3,4 mrad.

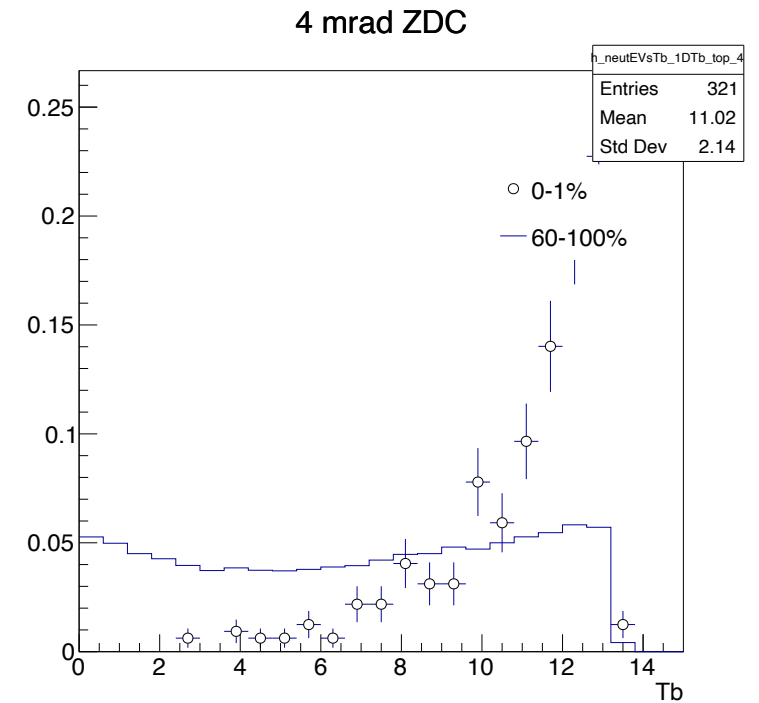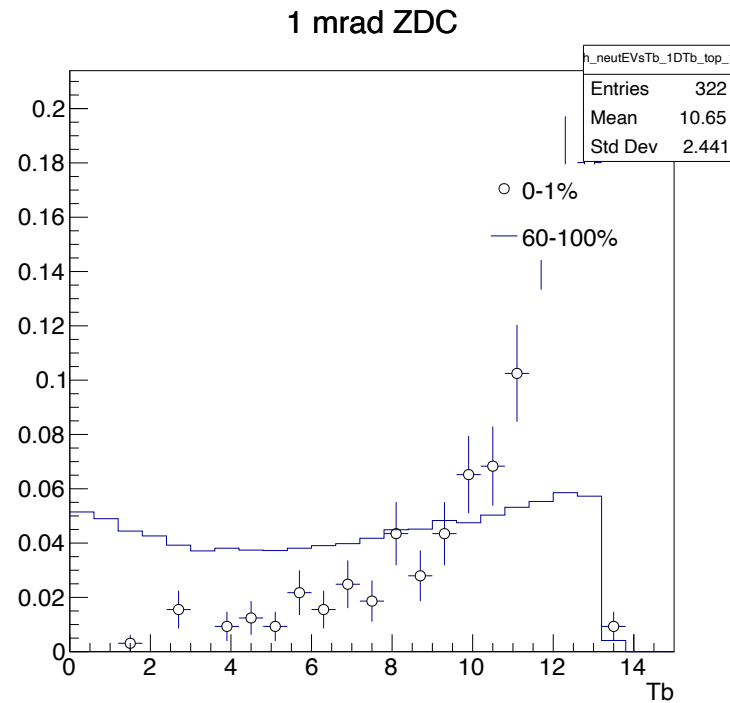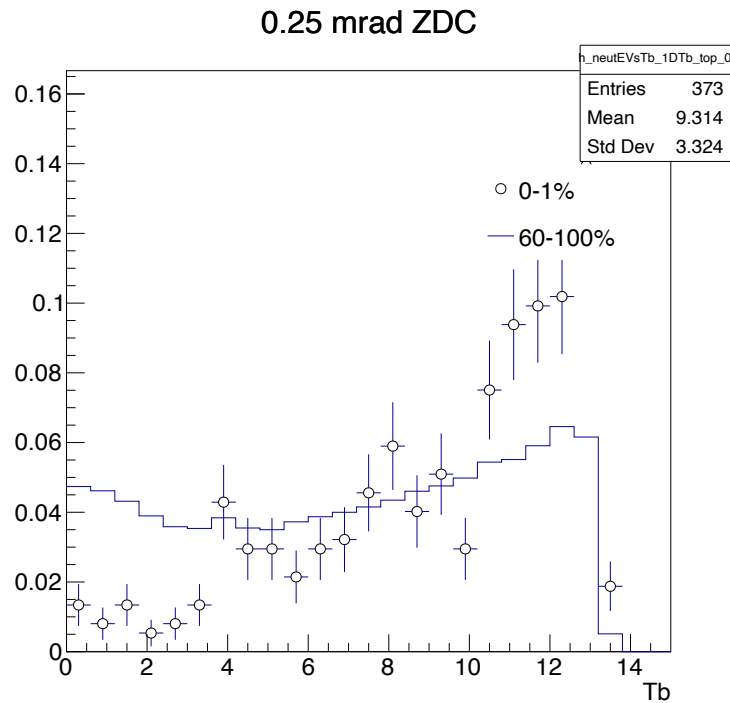- Truth level neutron selection.

Neutron energy distributions

E (GeV)

We cut each distribution by 0-1% and 60-100%.

Impact parameter b

0.25 mrad ZDC

h_neutEVsb_1Db_top_0	
Entries	373
Mean	4.021
Std Dev	1.796

○ 0-1%

— 60-100%

1 mrad ZDC

h_neutEVsb_1Db_top_1	
Entries	322
Mean	3.35
Std Dev	1.508

○ 0-1%

— 60-100%

4 mrad ZDC

h_neutEVsb_1Db_top_4	
Entries	321
Mean	3.123
Std Dev	1.45

○ 0-1%

— 60-100%

Not much impact until 0.25 mrad.
(I have plots for 2,3 mrad as well, just not shown)
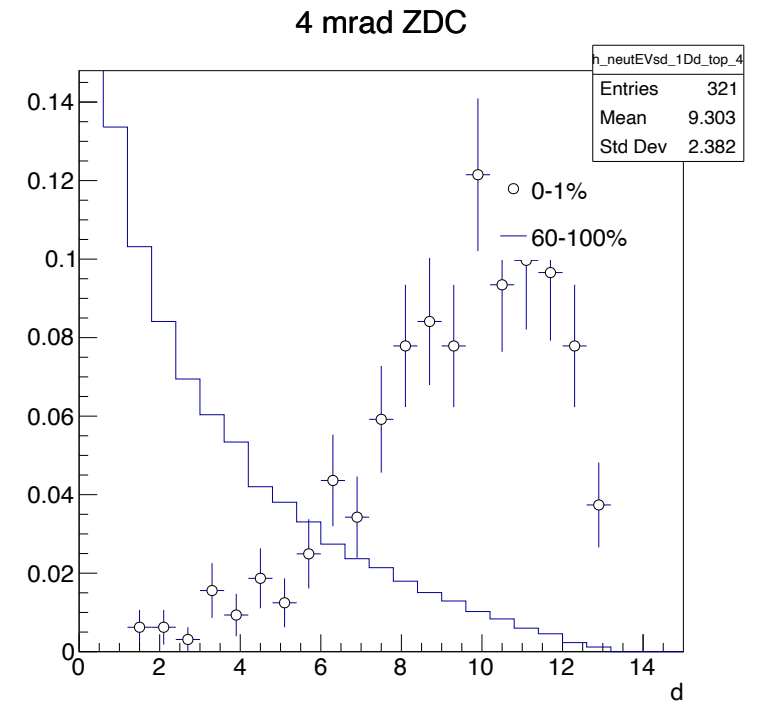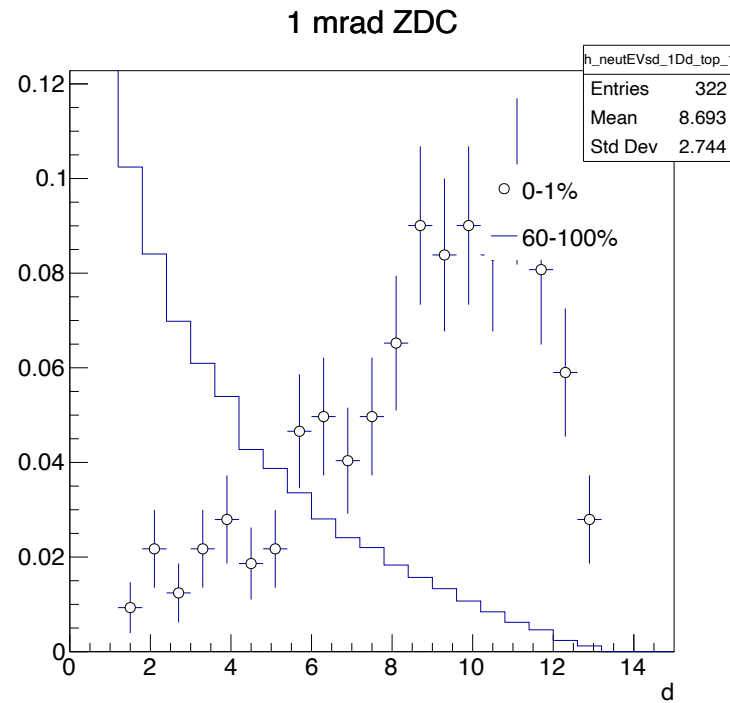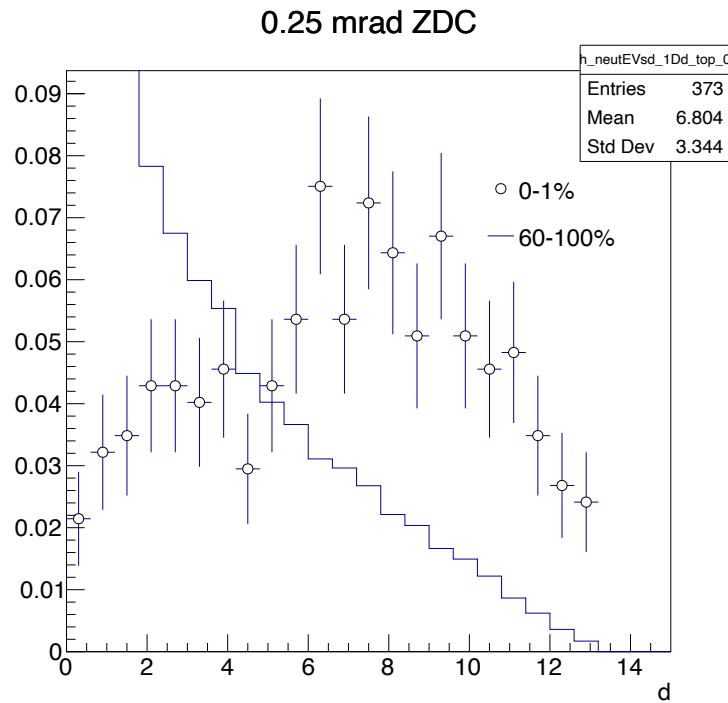
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Impact parameter Tb

0.25 mrad ZDC

1 mrad ZDC

4 mrad ZDC

Not much impact until 0.25 mrad.
(I have plots for 2,3 mrad as well, just not shown)

Impact parameter d

0.25 mrad ZDC

h_neutEVsd_1Dd_top_0

Entries	373
Mean	6.804
Std Dev	3.344

○ 0-1%

— 60-100%

1 mrad ZDC

h_neutEVsd_1Dd_top_1

Entries	322
Mean	8.693
Std Dev	2.744

○ 0-1%

— 60-100%

4 mrad ZDC

h_neutEVsd_1Dd_top_4

Entries	321
Mean	9.303
Std Dev	2.382

○ 0-1%

— 60-100%

Not much impact until 0.25 mrad.
(I have plots for 2,3 mrad as well, just not shown)

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Conclusion

- This study might not be the best for asking a large acceptance of ZDC.

- On the other hand, this study seems to be robust against the acceptance loss.

- We know already from our publication that smearing of ZDC will have little impact.