Diverging designs for the B0 magnet detector

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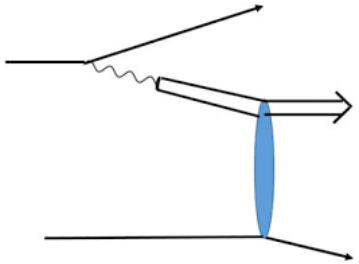
- The landscape, from the YR and ATHENA
- The B0 calorimeter in ATHENA and ECCE
- Discussion



The B0 detector

- Charged particle tracking + calorimetry inside the B0 magnet
- Photon detection covers $4.6 < \eta < 6$
- Fills gap between central detector and ZDCs
  - Central detector: now ~ $|\eta|<3.5$
  - ZDC: ~ $|\eta|>6.5$
  - Still gaps, but not very large gaps
- Critical for backward production (see Zach Swegers talk)

- Original instructions to group “All the collaborations are using the same forward detector designs, so there is no way to show ATHENAs advantages here.
  - Last week, we learned that this is not true

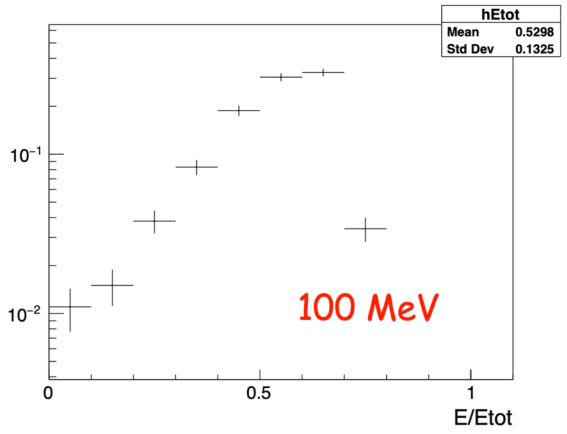
B0 calorimetry in ATHENA and ECCE

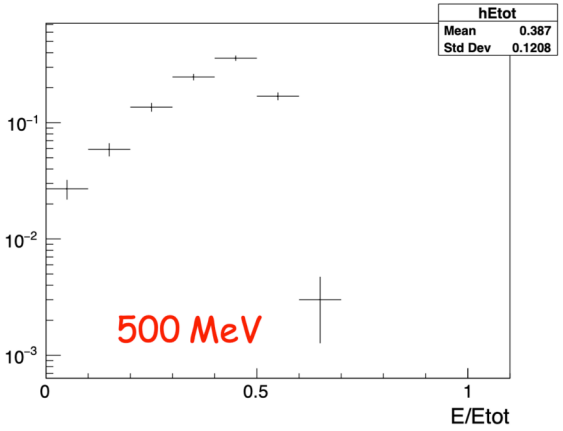
- In ATHENA: ‘pre-shower detector’
  - ~2 radiation lengths of converter with some layers of tracking detectors to observe e^+e^- from photon conversions
    - Fairly good efficiency, very little energy resolution
- In ‘baseline’ ECCE: 10 or 20 cm thick $PbWO_4$ Calorimeter
  - X_0=0.89 cm -> 10/20 X_0 thick
- The difference: a more realistic/conservative design

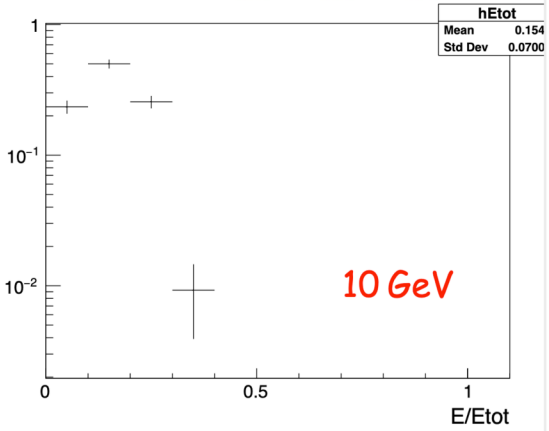
ATHENA info from Alex Jentsch, ECCE from
https://indico.bnl.gov/event/11463/contributions/52412/attachments/36426/59854/eic_ecce_final_1.pdf

ECCE calorimeter performance

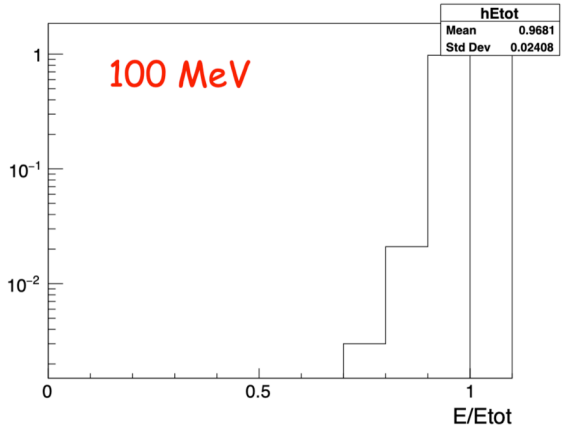
10 cm

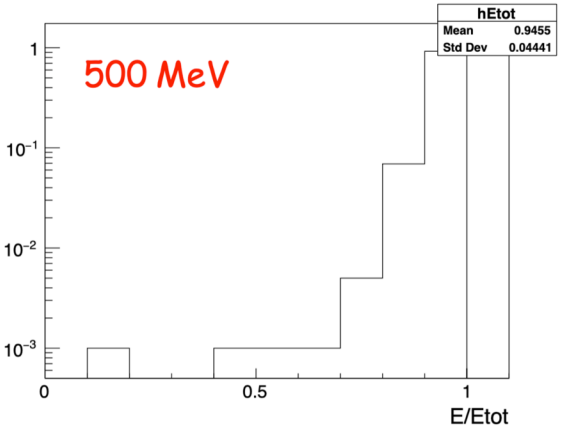


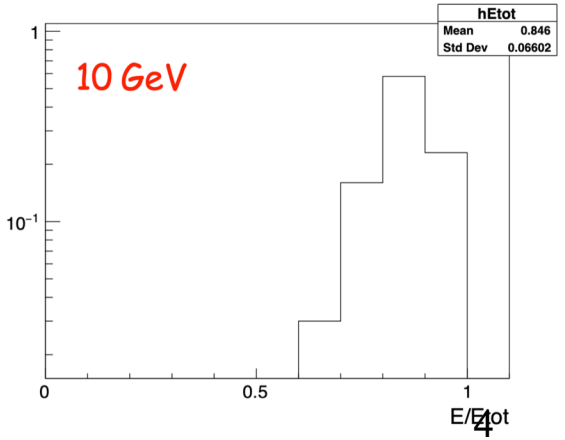




20 cm







Implications/Discussion/Conclusions

- Of course, we should not propose something that we do not think we can build.
- However, if the ECCE proposal has better B0 calorimeter performance, then the ECCE proposal can promise better physics performance, especially with backward production.
- How do we handle this?