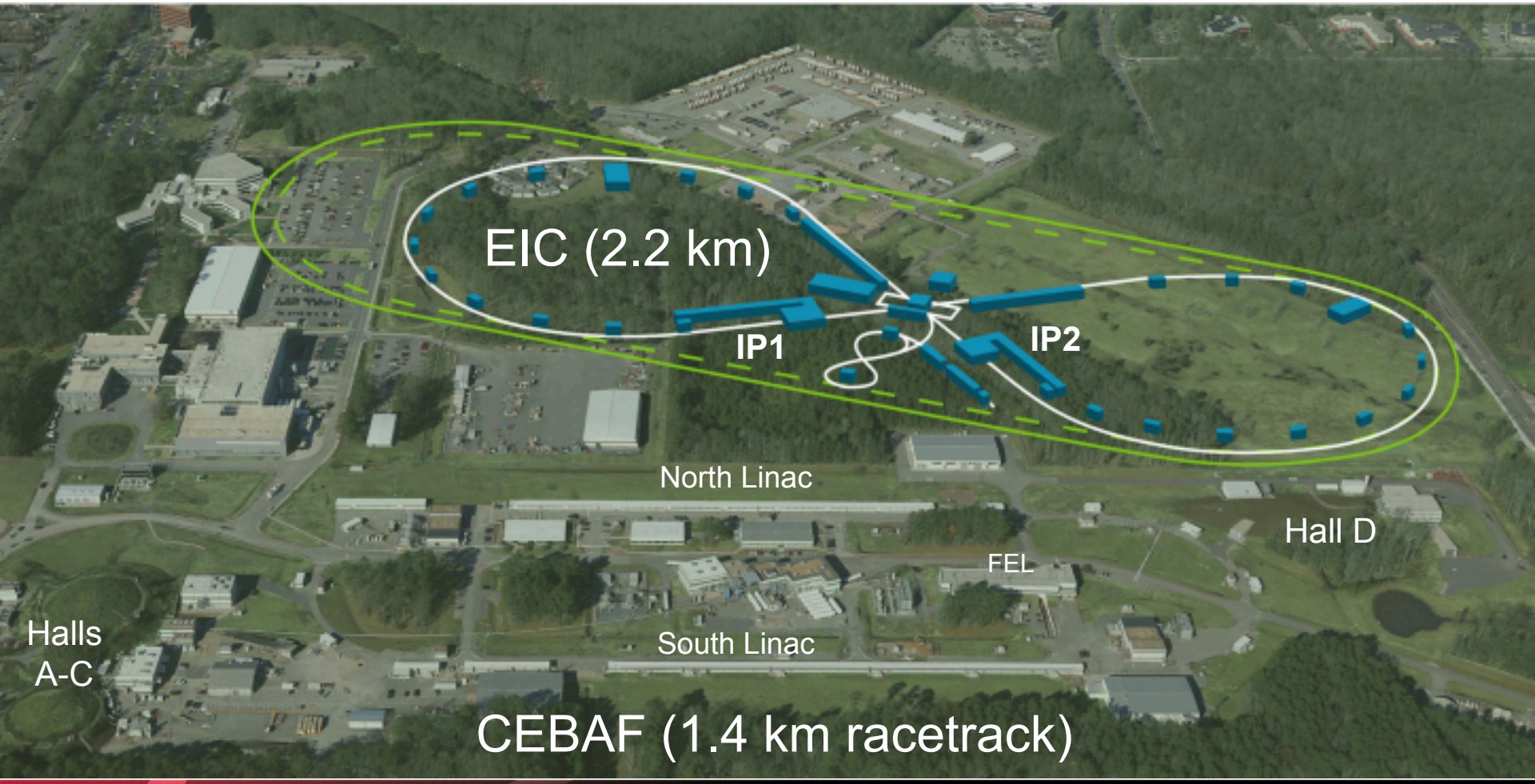
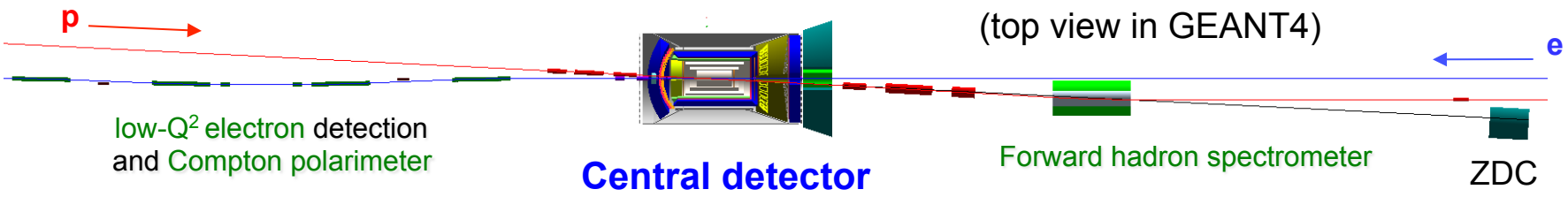
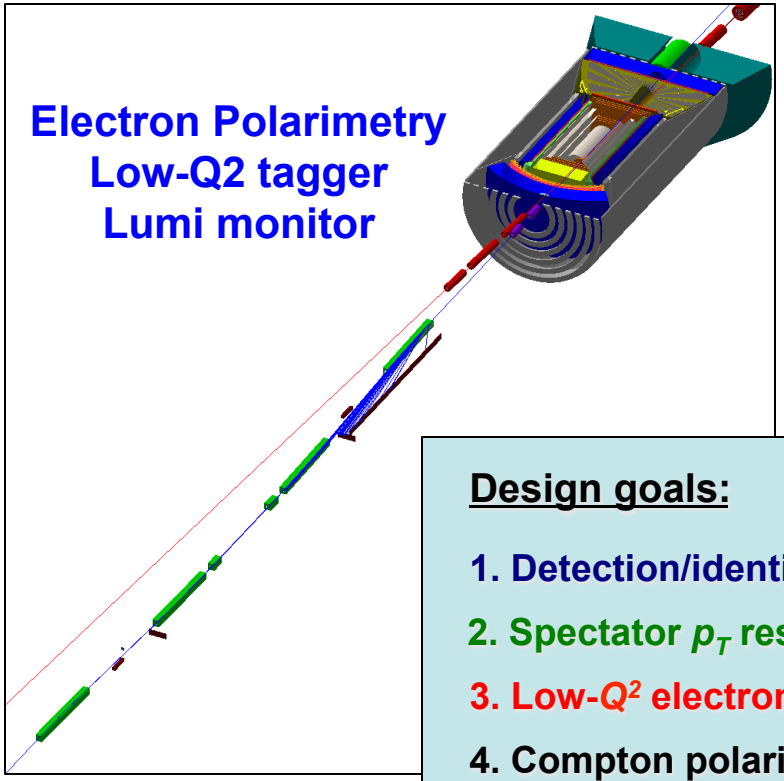
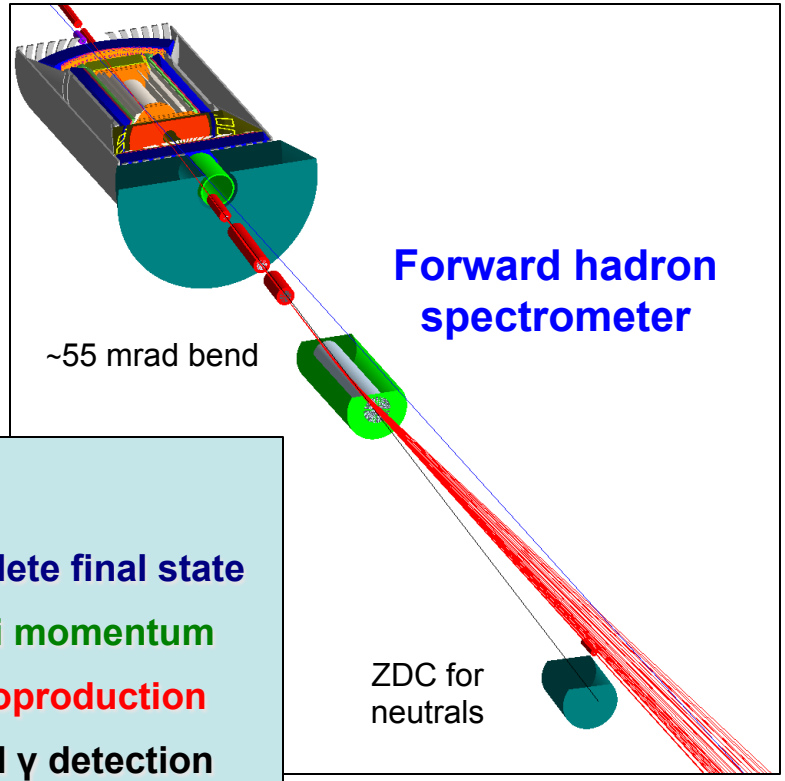
NPS in the JLab EIC detector



Design goals for the JLab IP1 detector







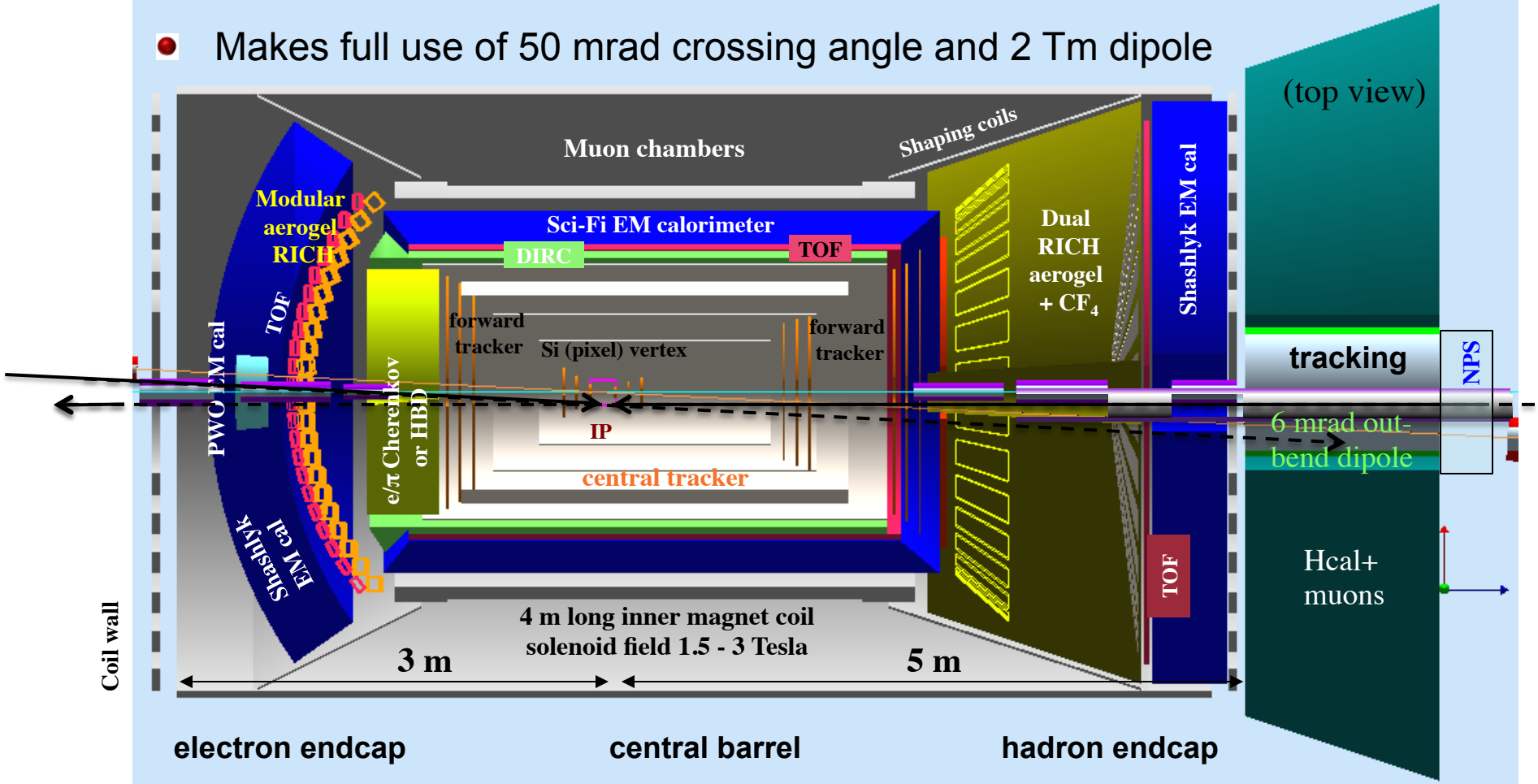
Design goals:

1. Detection/identification of complete final state
2. Spectator p_T resolution << Fermi momentum
3. Low-Q^2 electron tagger for photoproduction
4. Compton polarimeter with e^- and γ detection

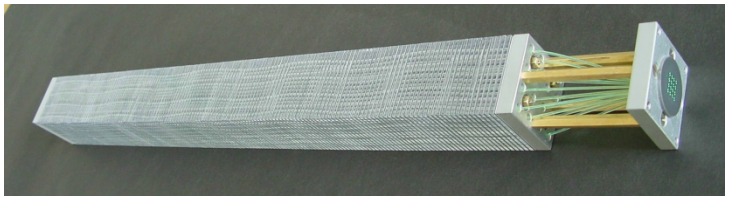
Central detector overview

- Asymmetric IP location within solenoid and different endcaps
  - Maximizes solid angle for electron endcap
  - More space for tracking and ID of high-momentum forward-going hadrons

- Makes full use of 50 mrad crossing angle and 2 Tm dipole

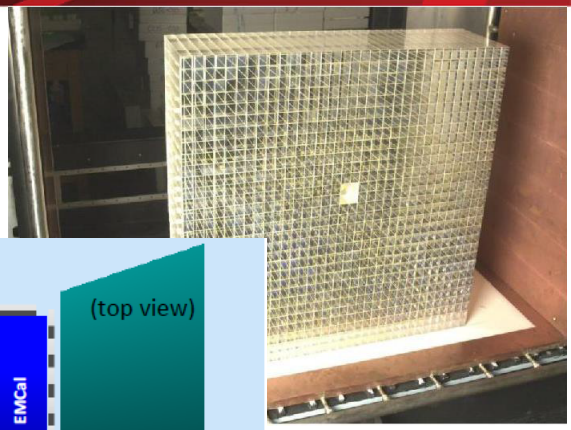


Electromagnetic calorimetry

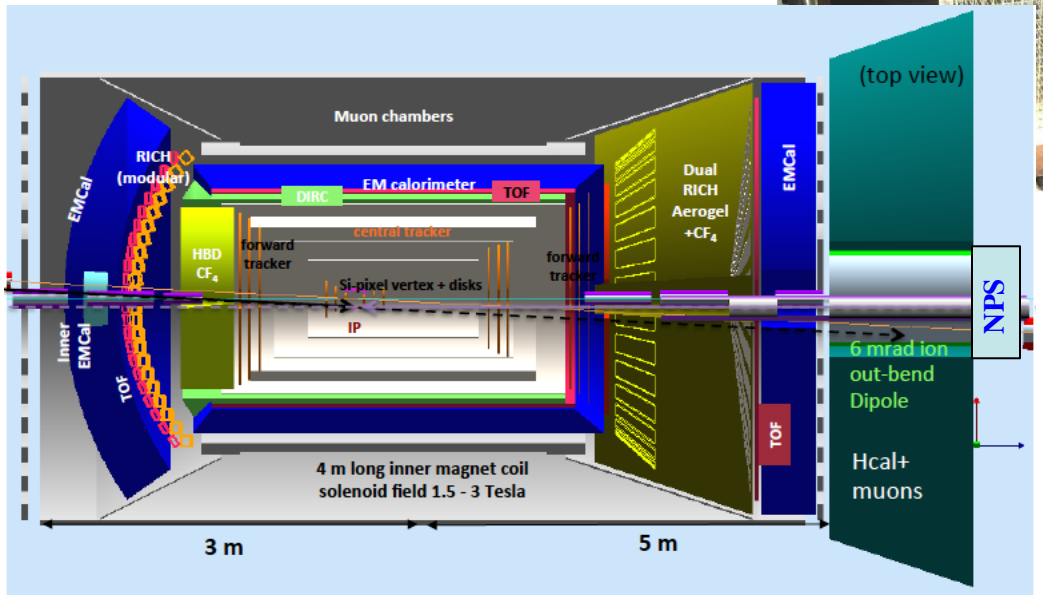


COMPASS Shashlik module
SoLID will use similar modules

Shashlyk and PWO_4 R&D is carried out by the eRD1 calorimetry consortium

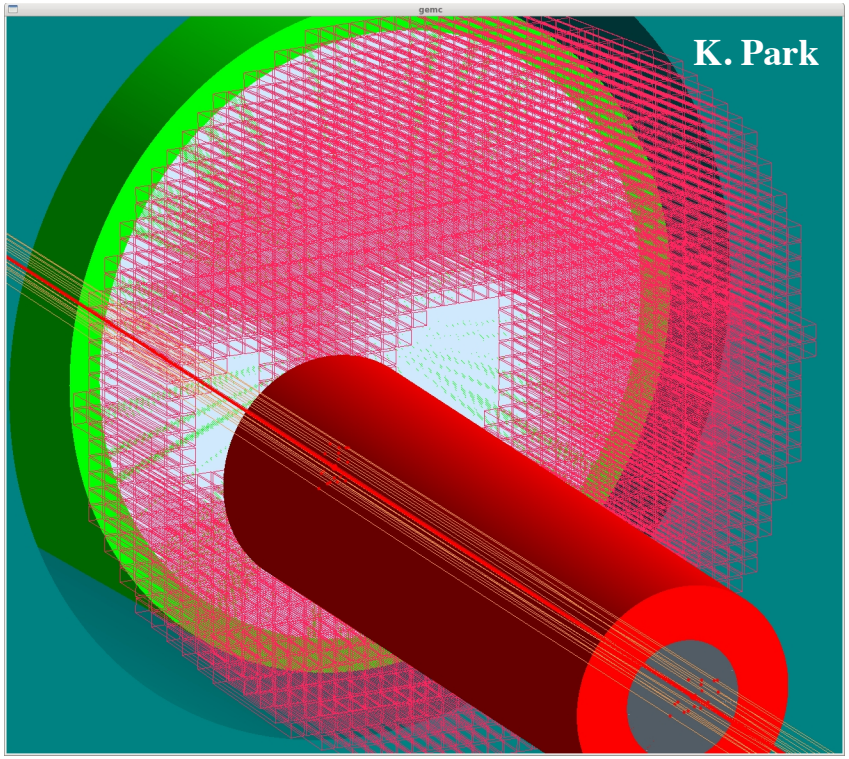


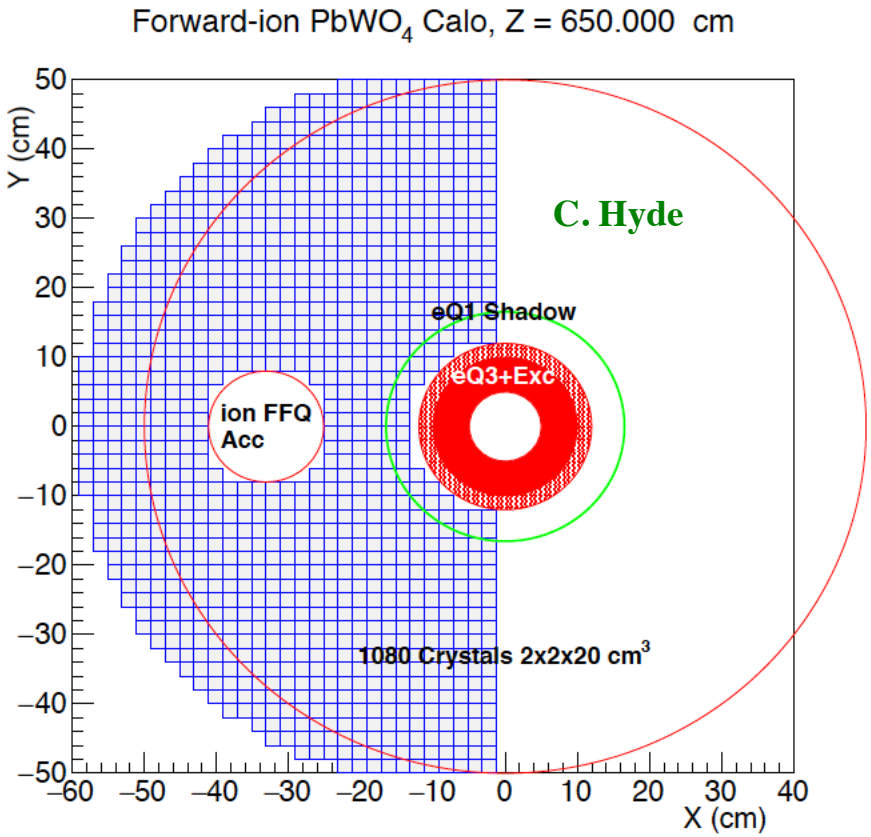
JLab NPS PWO_4 crystals can be re-used on hadron side



- As in CLAS, the endcap EM cals are divided into inner and outer parts.
  - Outer: Shashlyk
  - Inner: PWO_4
- Outer calorimeter provides e/π ID and photon detection
- The high-resolution (2%/√E) inner calorimeter also provides energy information for electron momentum reconstruction where the tracking resolution is poor
- Compact scintillating fiber EM cal in central barrel
  - GlueX BCAL (lead Sci-Fi) is a good option
  - Tungsten powder (eRD1) could be an alternative, although construction is very labor intensive
  - Pre-shower functionality (γ/π^0 separation for DVCS) is important in both barrel and endcaps

New NPS crystal configuration





- NPS in GEMC (in front of ion FFQ)
- NPS covers about half of solid angle
- A high-resolution, small-angle EM calorimeter will be important to, for instance, detect excitations in DVCS recoil baryons: $\Delta^+ \rightarrow \pi^0 p$