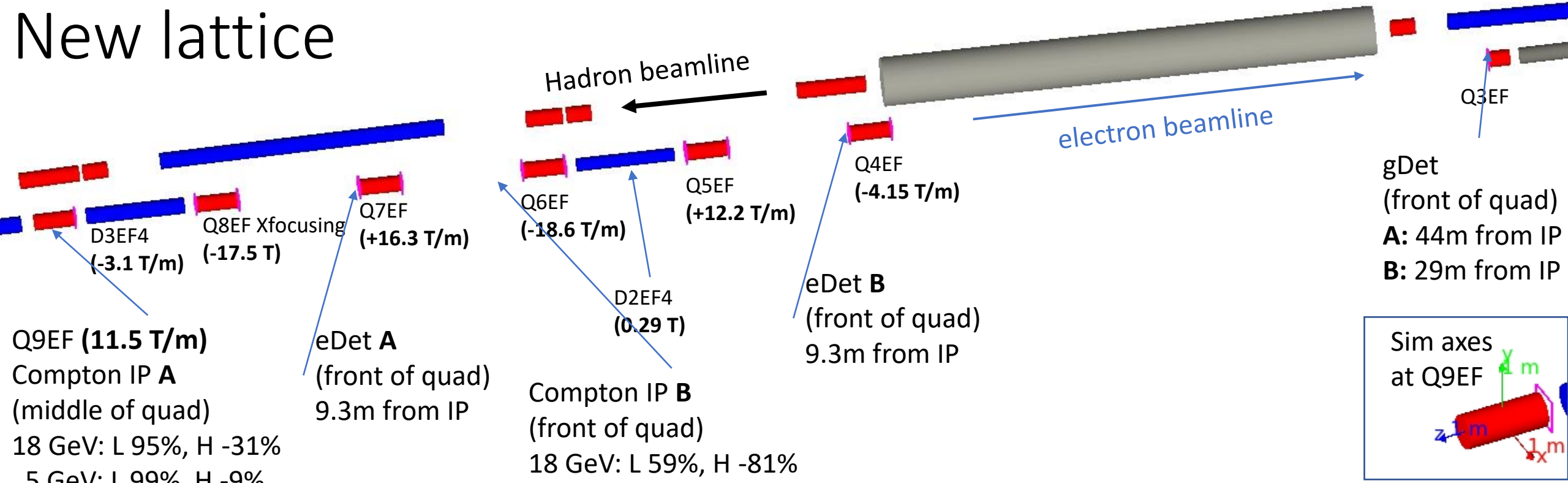
Compton IP location (V3)

Ciprian Gal

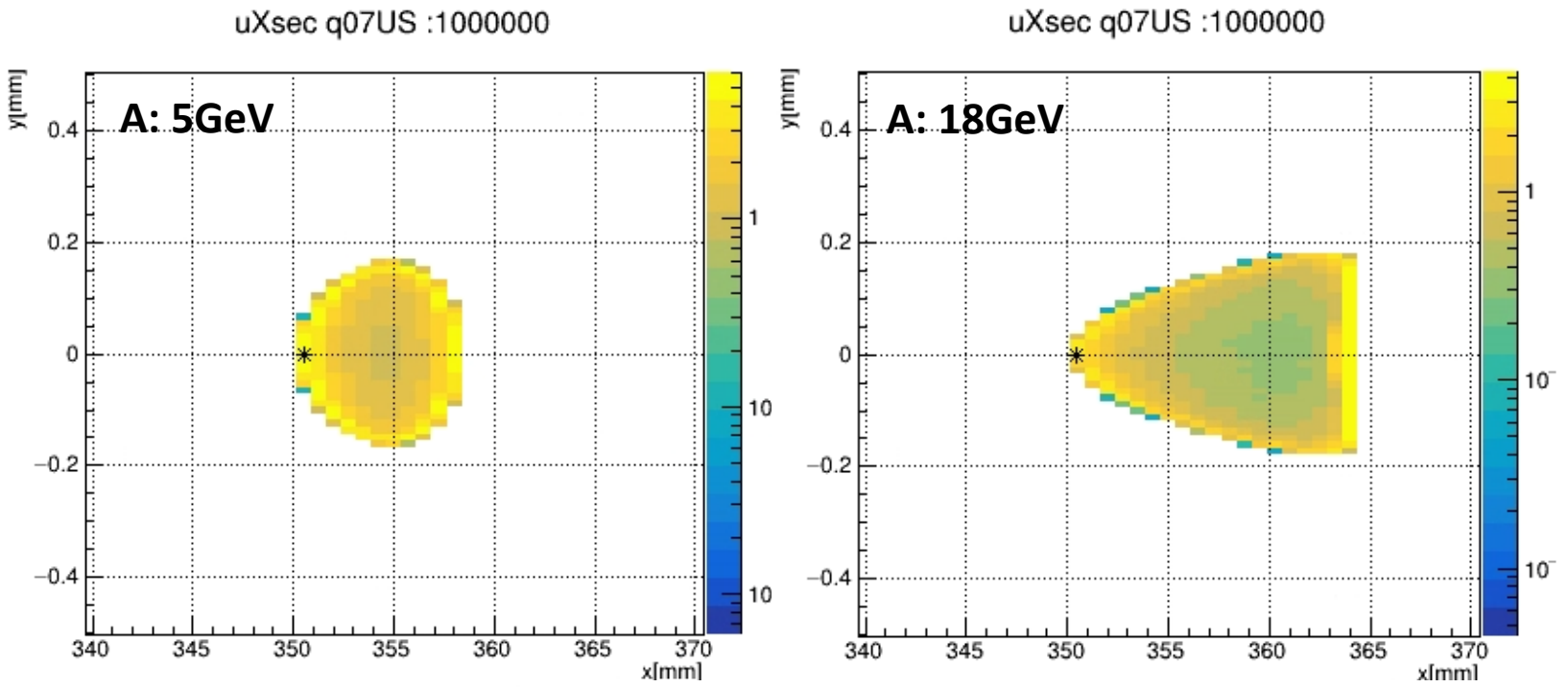
New lattice

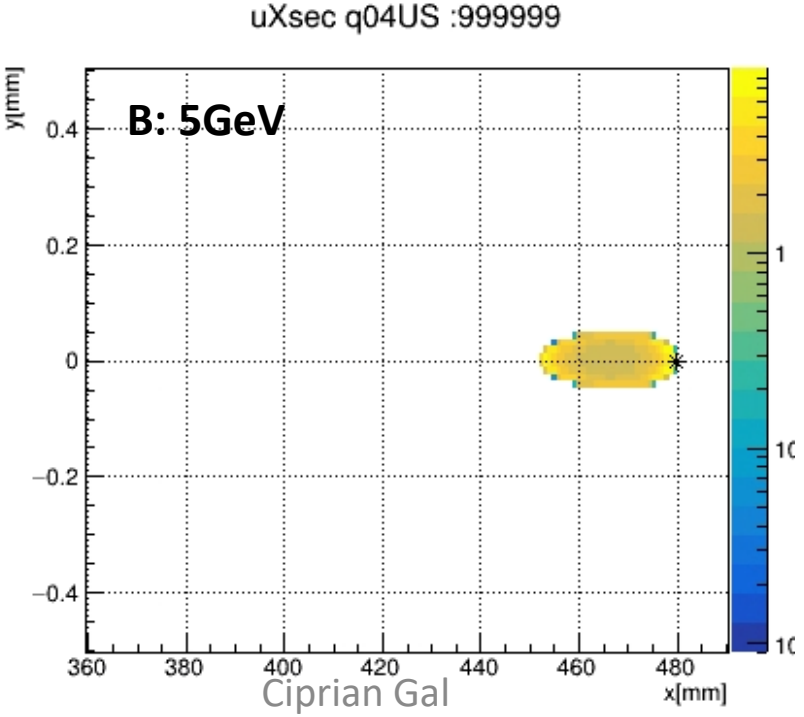


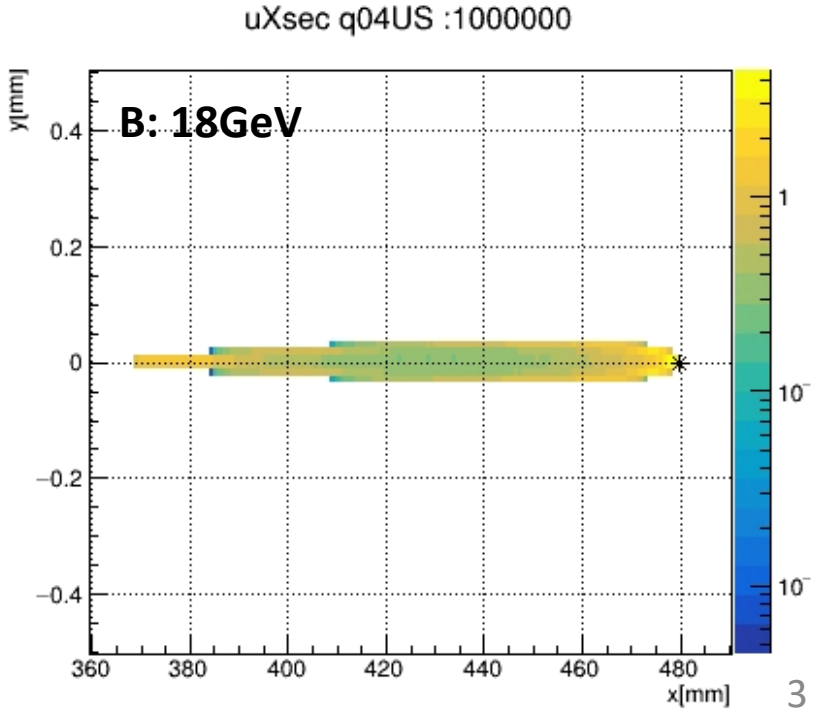
- Using the information Vadim provided we can determine what the electron beam spin orientation will be at the two possible Ips
- Generated events with the 4 configurations (2 energies and 2 spin directions) and propagated them from the lattice

Electron detector

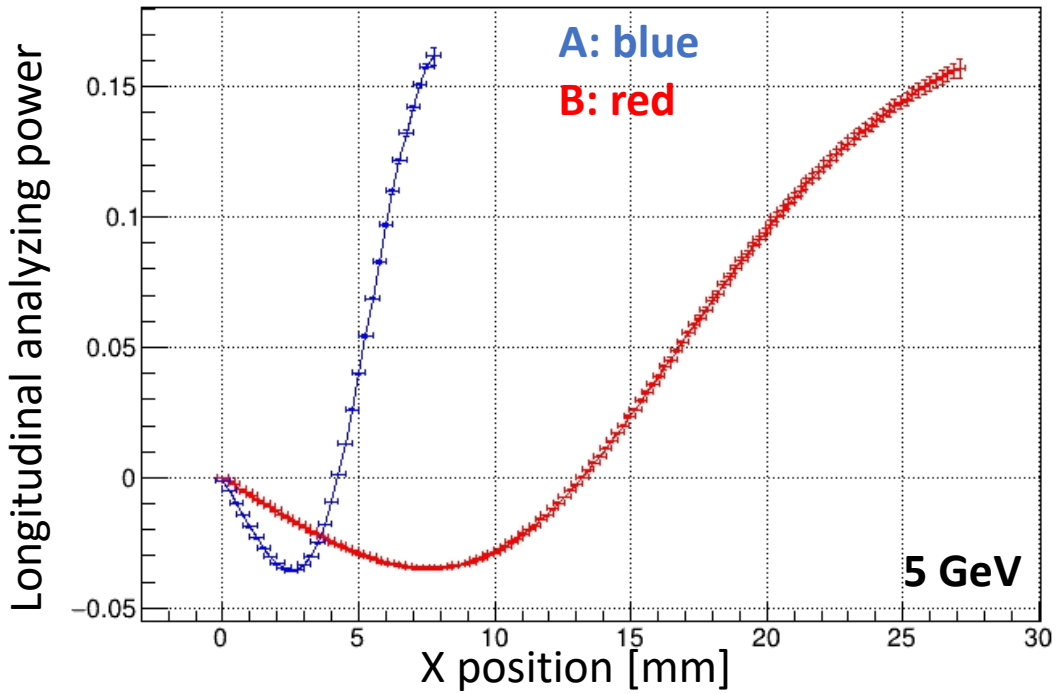
- The top row shows version A (IP in the middle of the quad) and the bottom shows version B (IP in the drift region before Q6)
- The horizontal extent of the scattered electrons is much improved at both energies in the B location
  - The requirements for the detectors will not be so tight as what we would need in location A

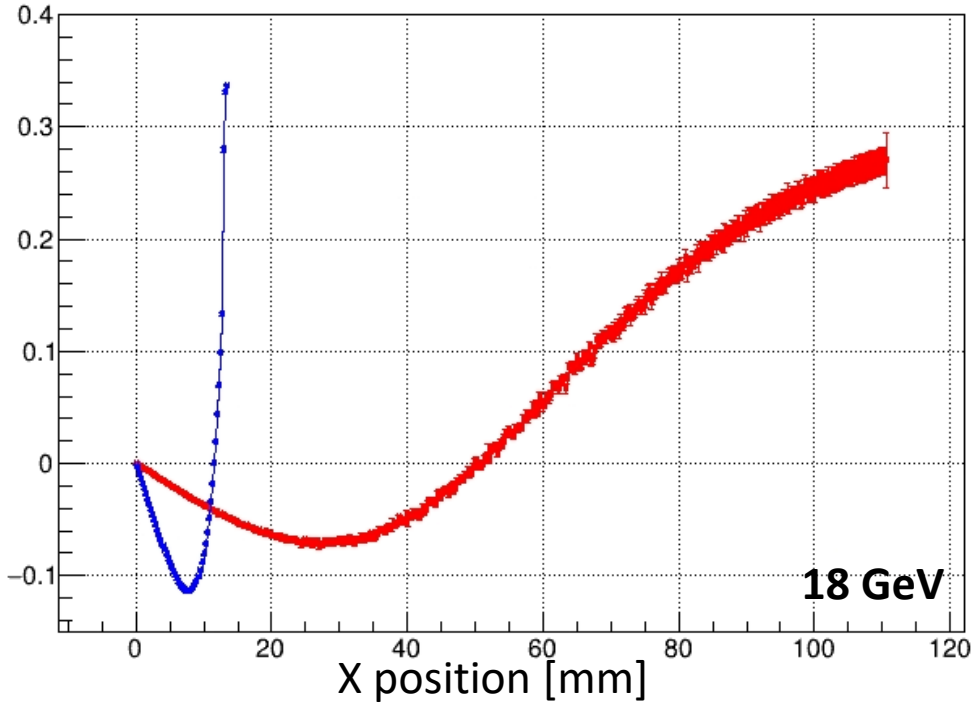






Electron

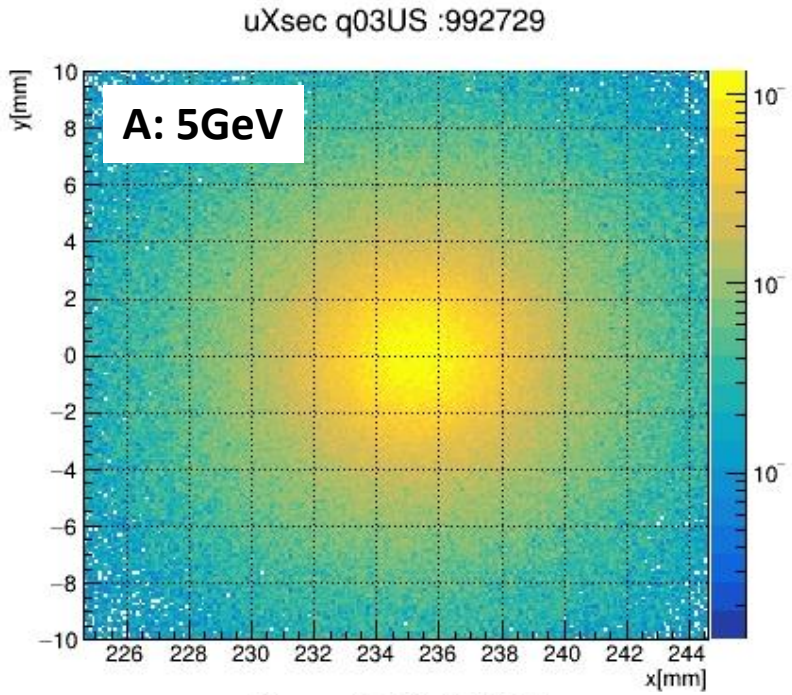


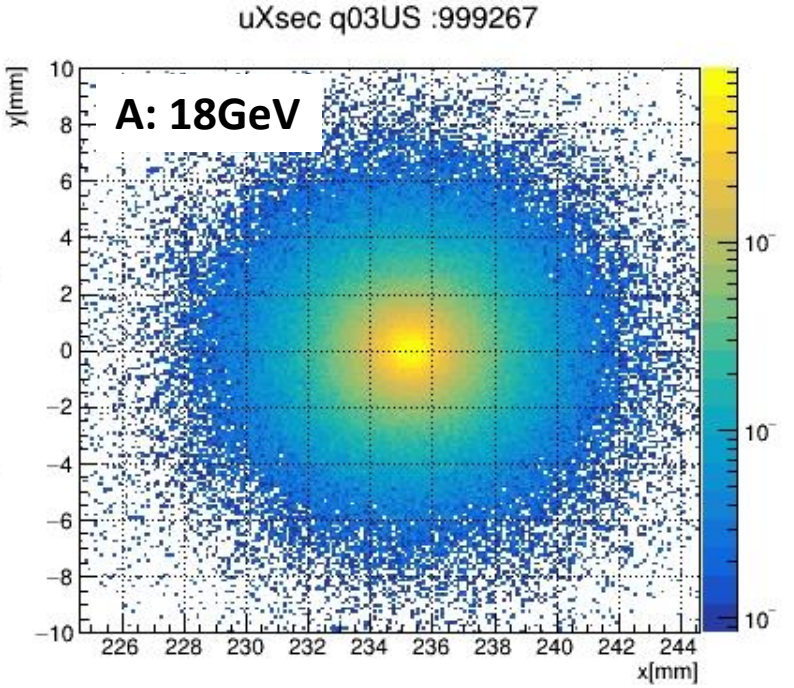


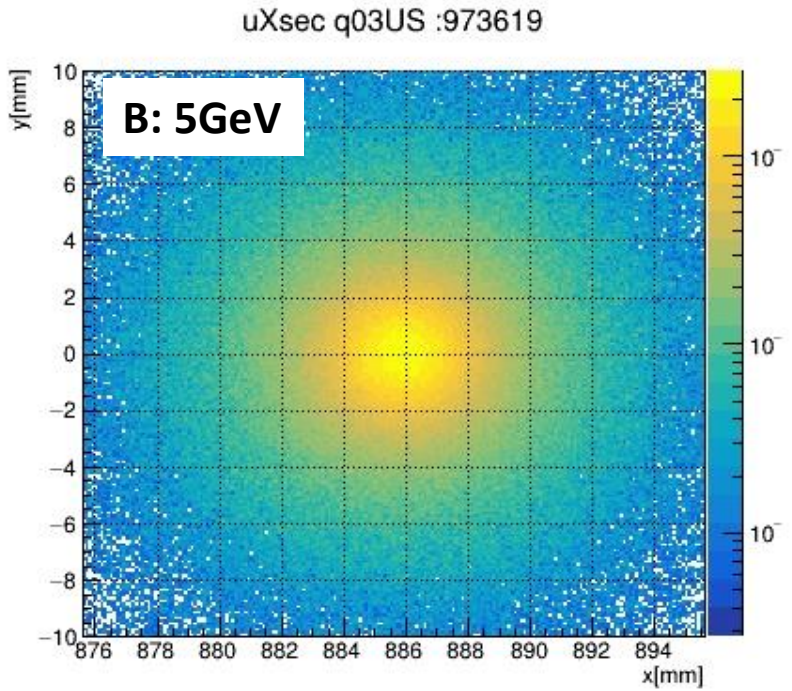
- While the two IPs have significantly different degrees of longitudinal polarization (especially at 18GeV) due to the “mixing” from the focusing quad we can see that the overall analyzing power is fairly comparable
- The closest approach of the detector is (as before) in the 5 GeV configuration and is ~7mm (3mm) in version B (A)

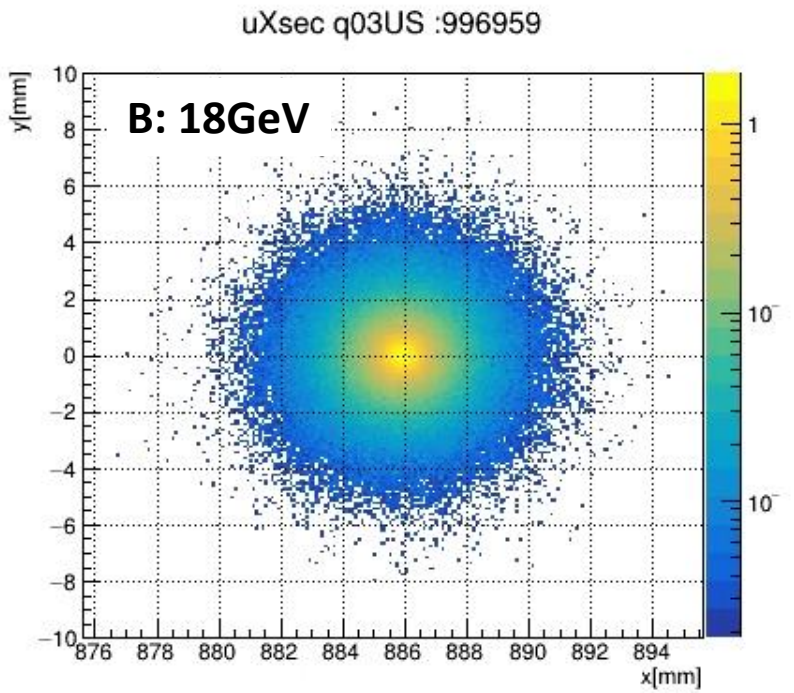
Photon detector

- For both energies we can see the reduced extent of the photons at the detector location in version B

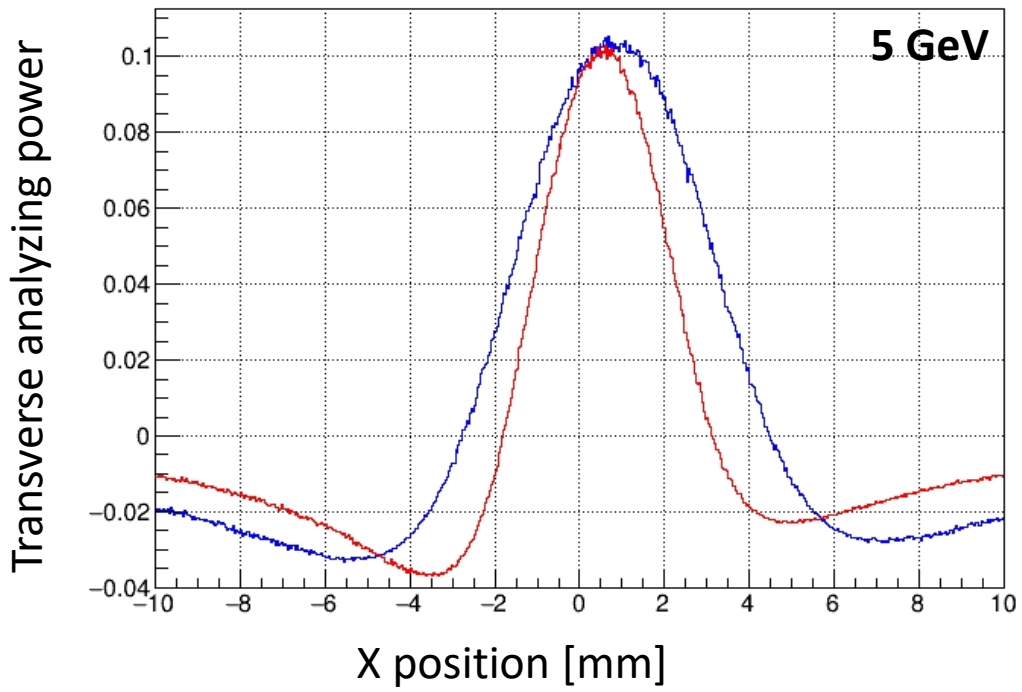


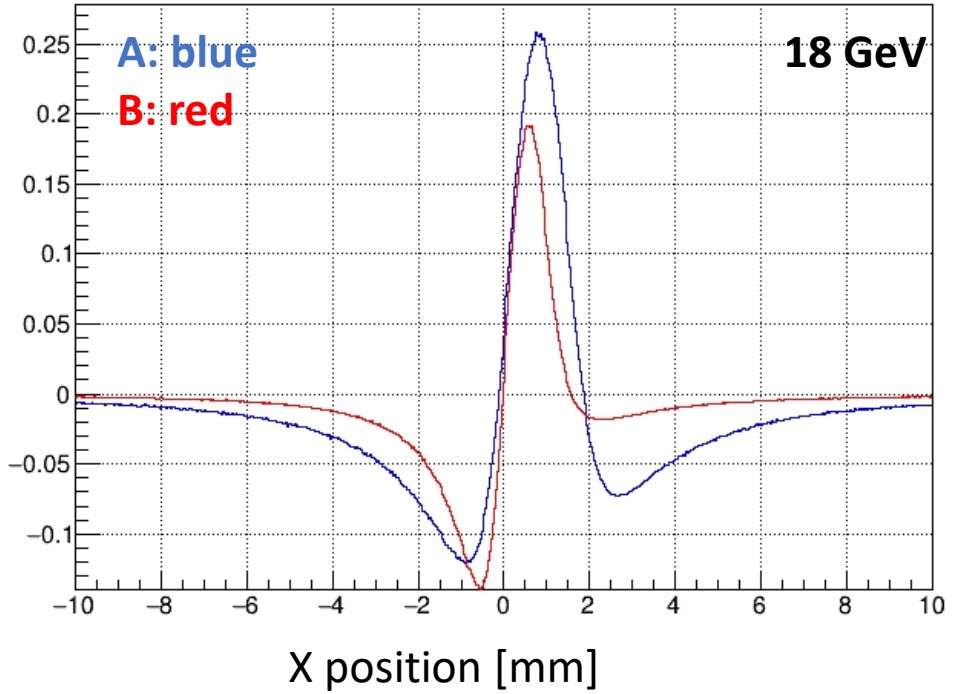






Photon





- Here I looked only at the transverse components (the longitudinal will be comparable to what we can get from the electron detector)
- The shorter drift distance for the photons to the detector translates into a tighter constraints on the position resolution for version B (but only partially)
  - It looks like with the segmentations we have discussed before we should not have significant trouble with the transverse measurement
- One thing to note is that the higher degree of transverse polarization results in a more symmetric distribution (at 18GeV) presumably leading to reduced systematics in the determination of this component

Conclusions

- I believe placing the IP in front of Q6 reduces a large number of complications and comes with only a slight reduction in analyzing power
  - This configuration allows for more space for the laser table, modifications (hole) needed to only one quad (Q04), no additional changes to the lattice would be needed