IP6 Compton simulation update

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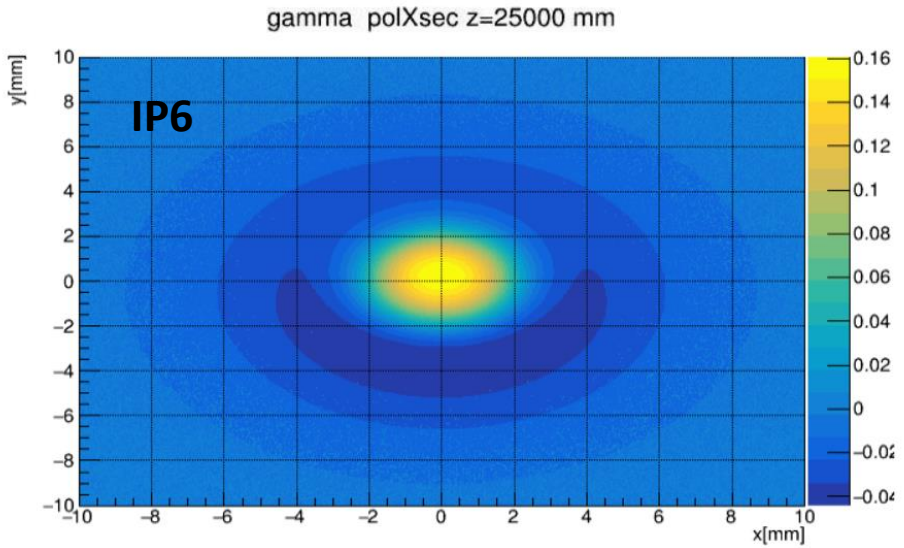
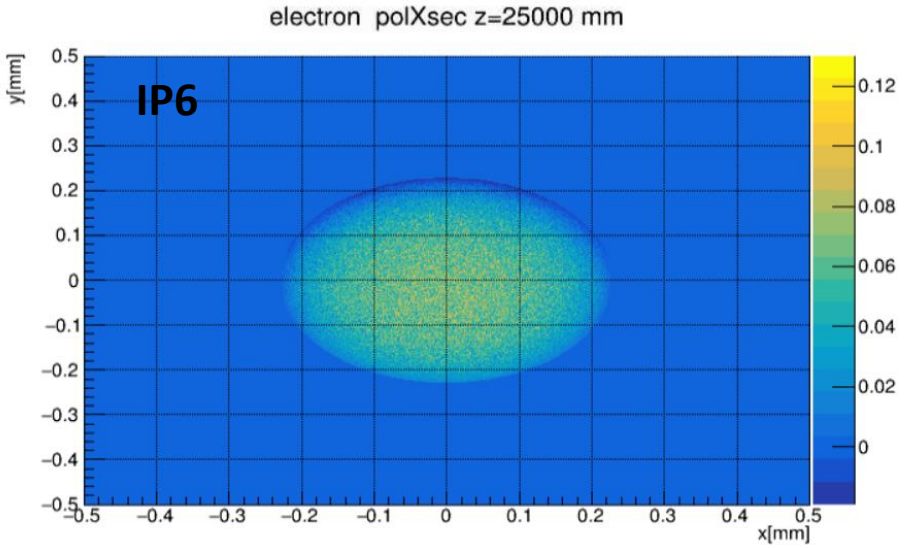
Non-longitudinal polarization

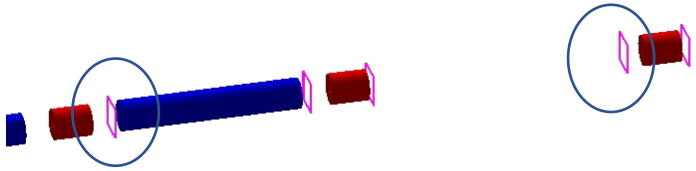
	polarization at Compton IP	
Beam energy [GeV]	Longitudinal [%]	Vertical [%]
5	97.6	21.6
10	90.7	42.2
18	70.8	70.6

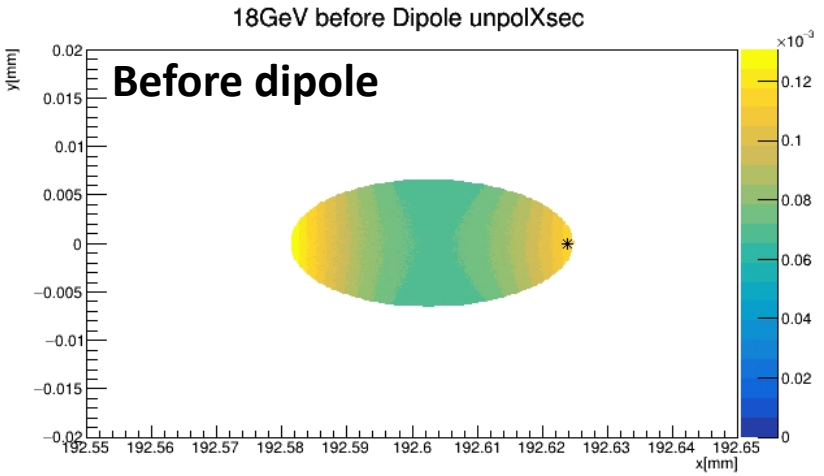
- Last time I showed some distributions for a vertical/longitudinal mix of spin directions
- However the remaining component of the polarization at the Compton interaction point is horizontal with the dipole doing the work to bring it to fully longitudinal at the main interaction point

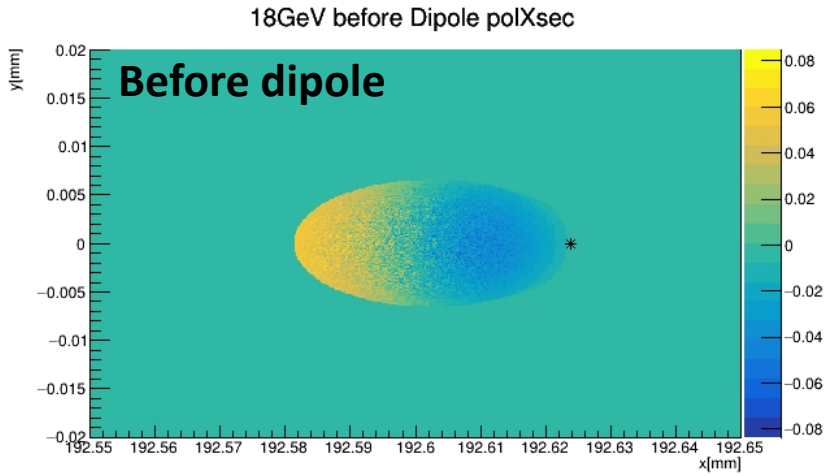


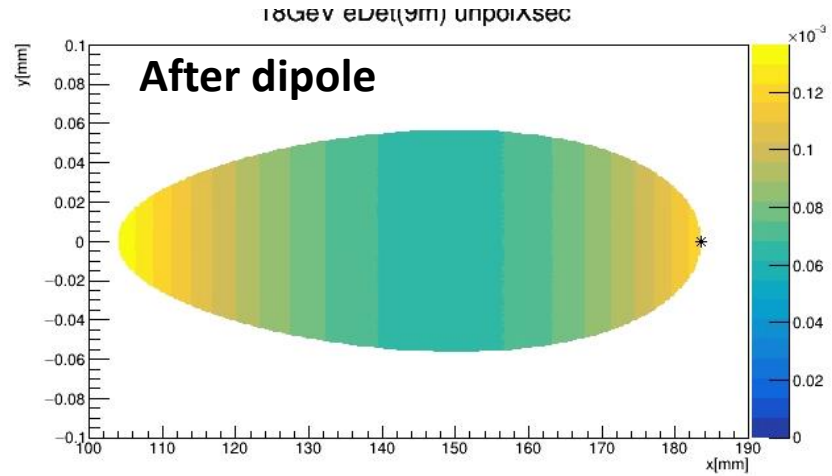


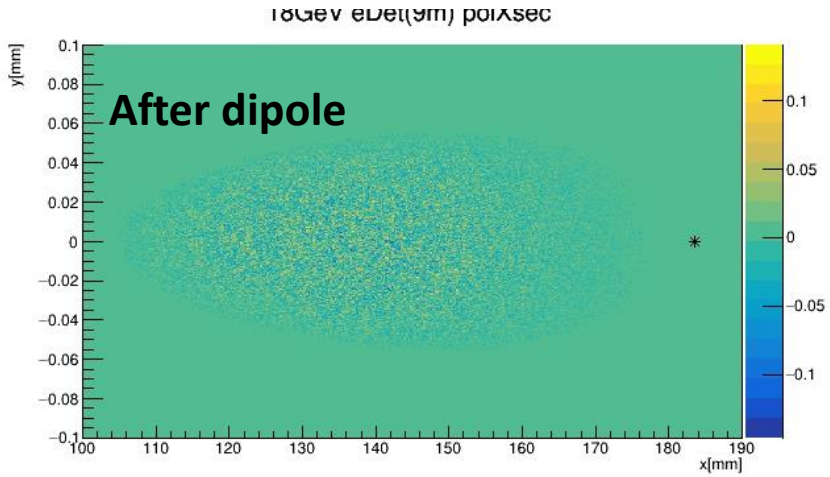
100% horizontal polarization (18 GeV)





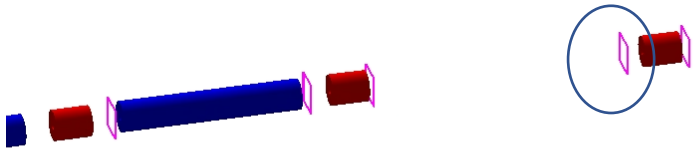


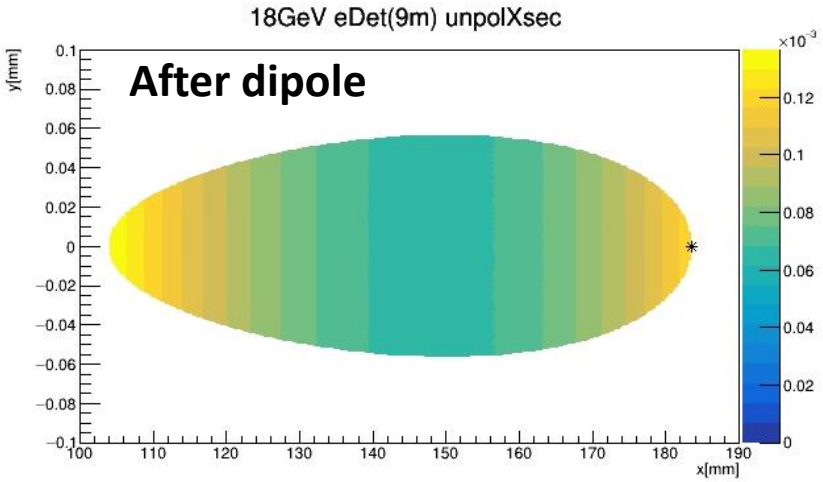


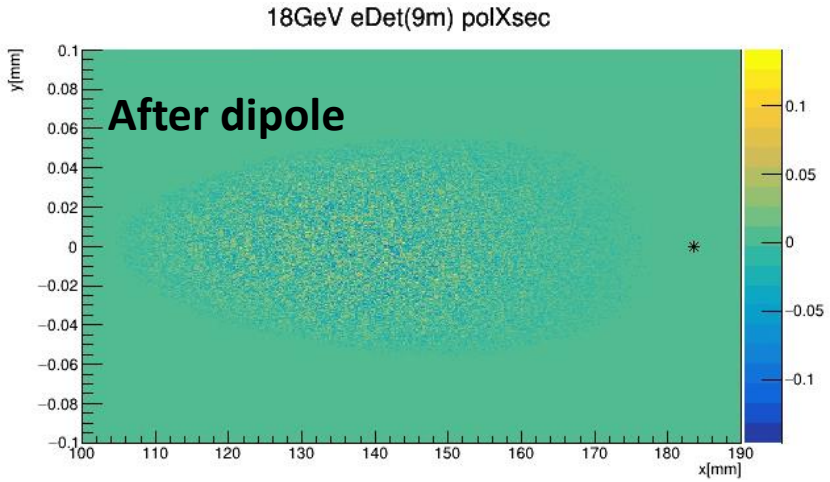


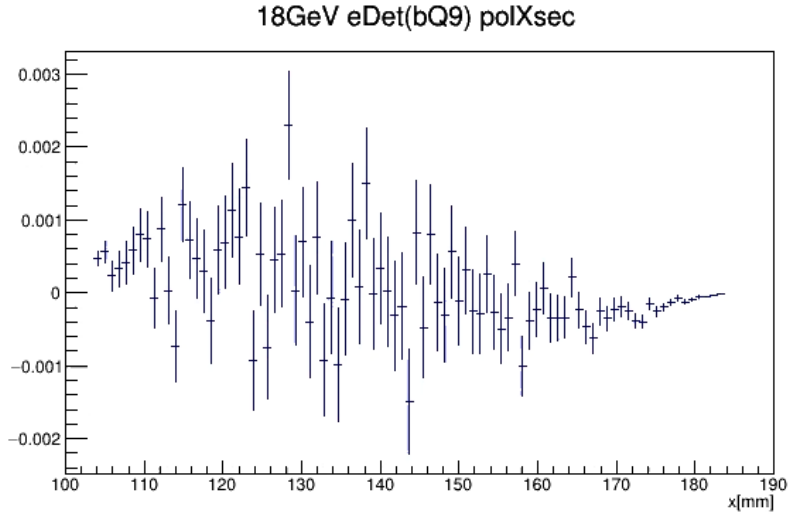
- Using the same magnet setup I ran events with 100% horizontal polarization for the electron beam
  - The result was a left-right asymmetry as can be seen before the dipole
- The dipole itself however erases any remnant of this asymmetry

100% horizontal polarization (18 GeV)



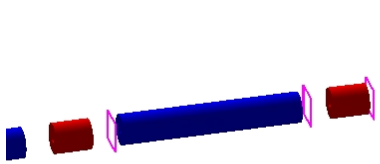


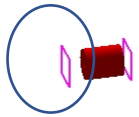


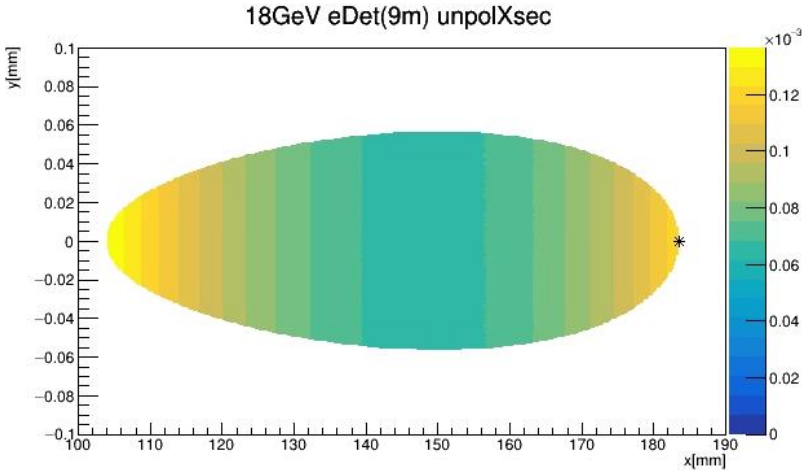


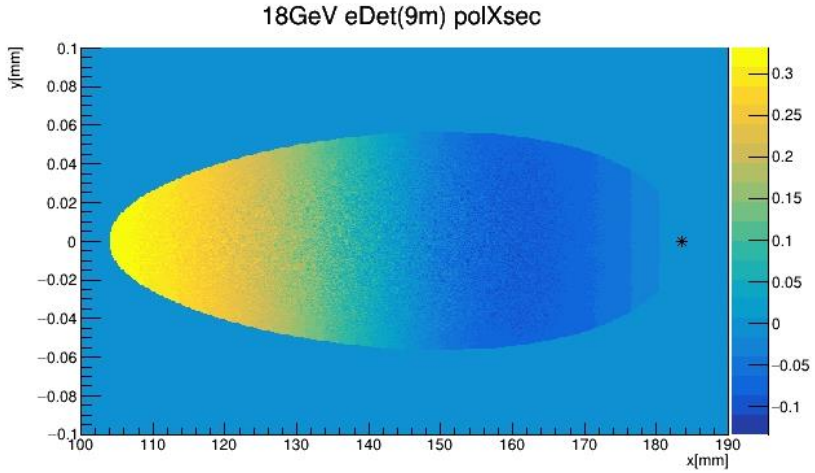
- The dipole itself however erases any remnant of this asymmetry
- To be sure I looked at the analyzing power as a function of horizontal position and indeed what we see is just noise
- This means that the only thing that the electron could measure is the longitudinal component through either a positional or calorimetric determination
- A similar result can be seen at 5 GeV

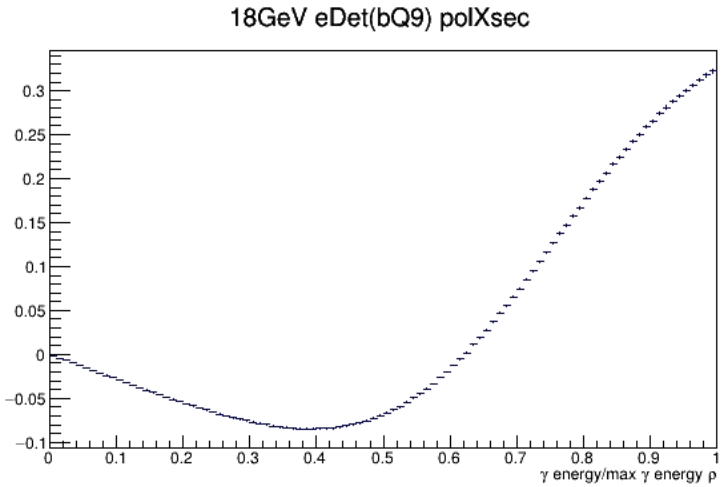
Electron detector location: 18 GeV

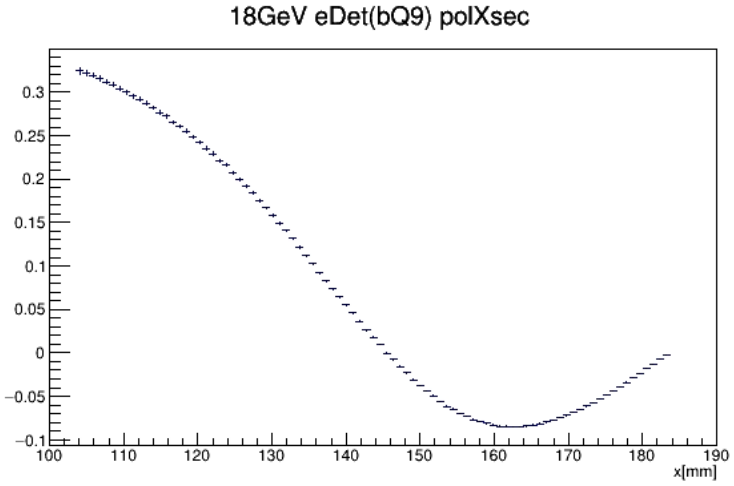




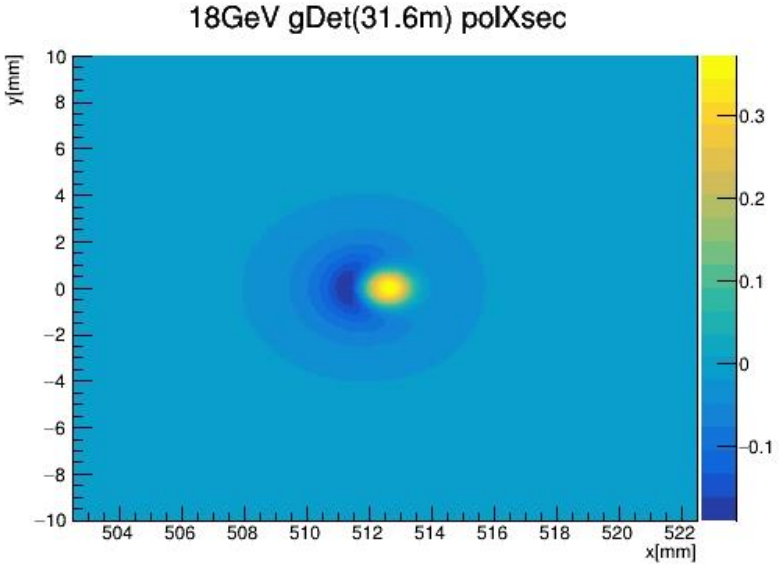








- Indeed looking at the analyzing power as a function of position at the electron detector it is a mirror image of the photon energy asymmetry
  - Potentially sensitive to vertical components
- The only information we would have on the horizontal component would be the positional information from the photon detector



Next steps

- Use a 2D fitting routine to estimate pixel/strip requirements for the photon detector

- Simulation setup based on Zhengqiao's setup is now at https://github.com/eic/compton
  - Includes reading in directly output from https://gitlab.com/eic/mceg/comptonRad and some basic analysis macros and setup