Update on the finalized lattice for Compton polarimeter at ESR

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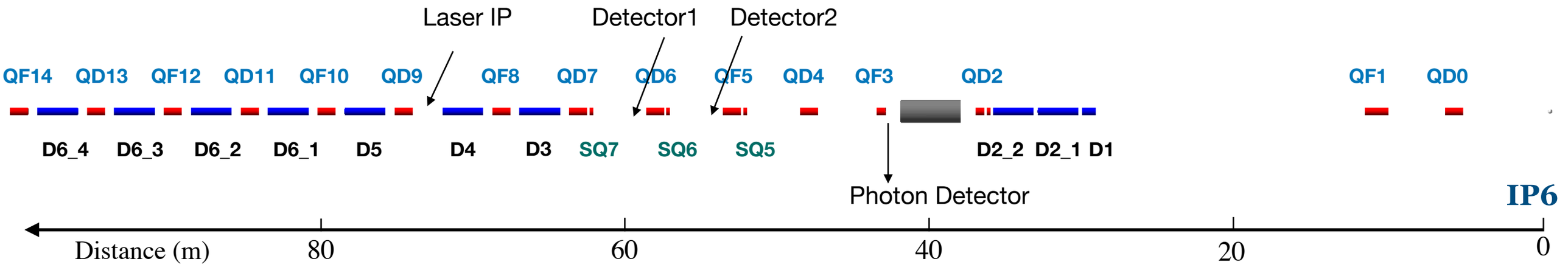
2023 Dec 13

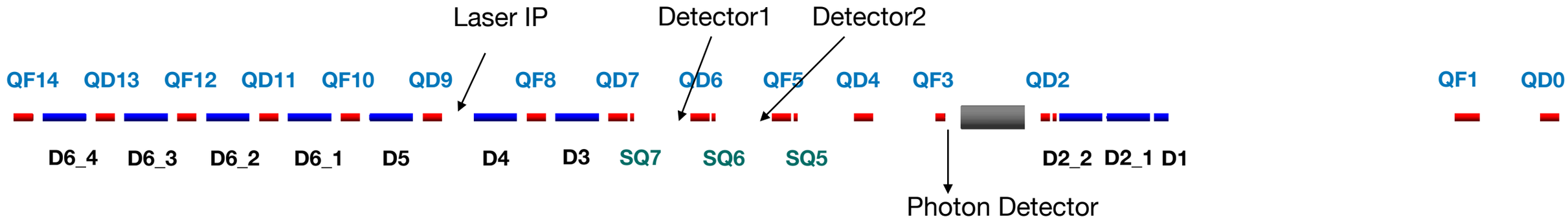
Lastest version

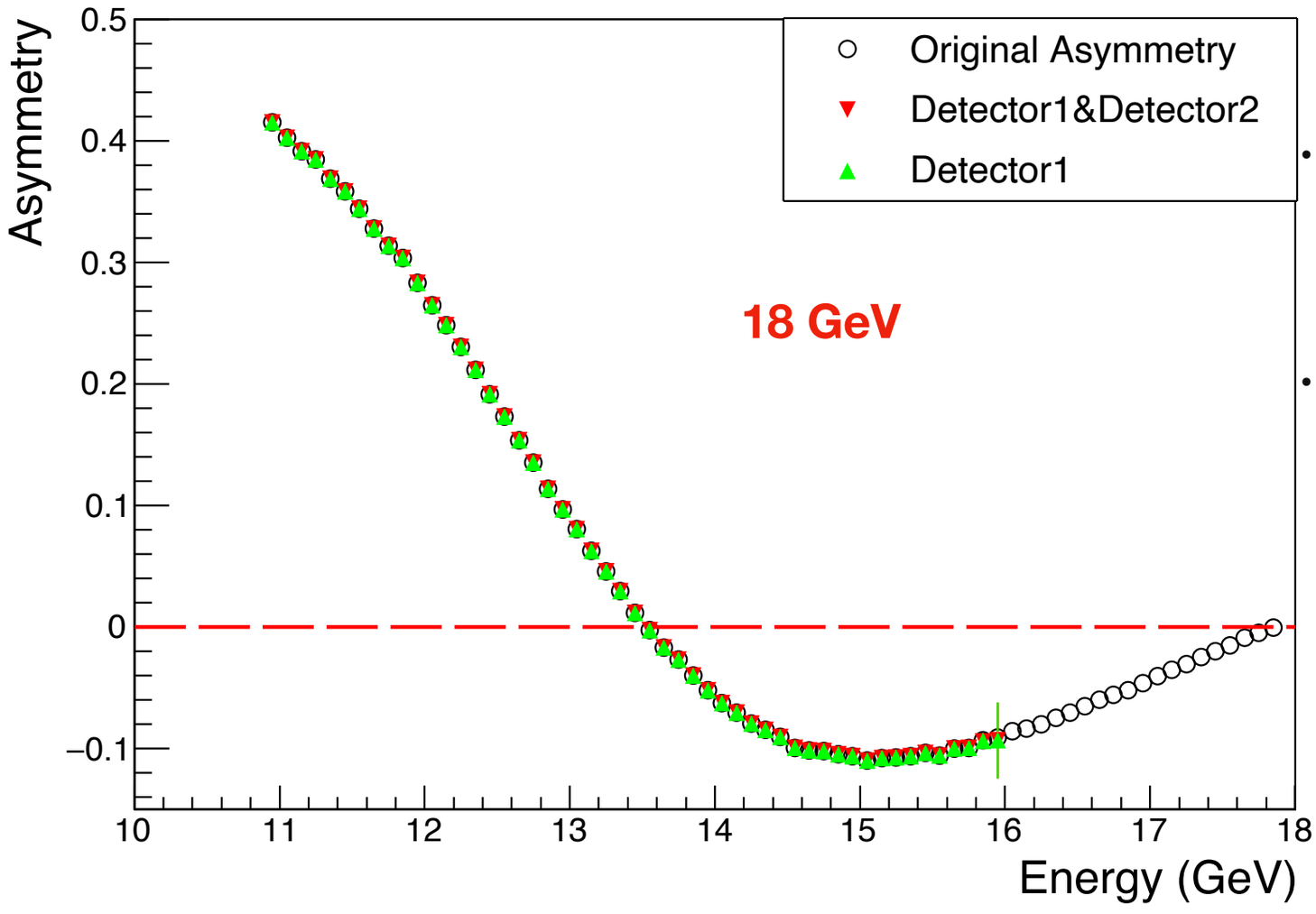


Beam Energy	P_L	P_T
5GeV	99.3%	11.8%
10GeV	97.3%	23.0%
18GeV	91.4%	40.5%

	bending angle	length
D6	11.9 mrad	2.726 meters
D5, D4	1.5 mrad	2.726 meters
D3	13.0 mrad	2.726 meters
D2	-11.7 mrad	2.726 meters
D1	-1.5 mrad	0.89 meters

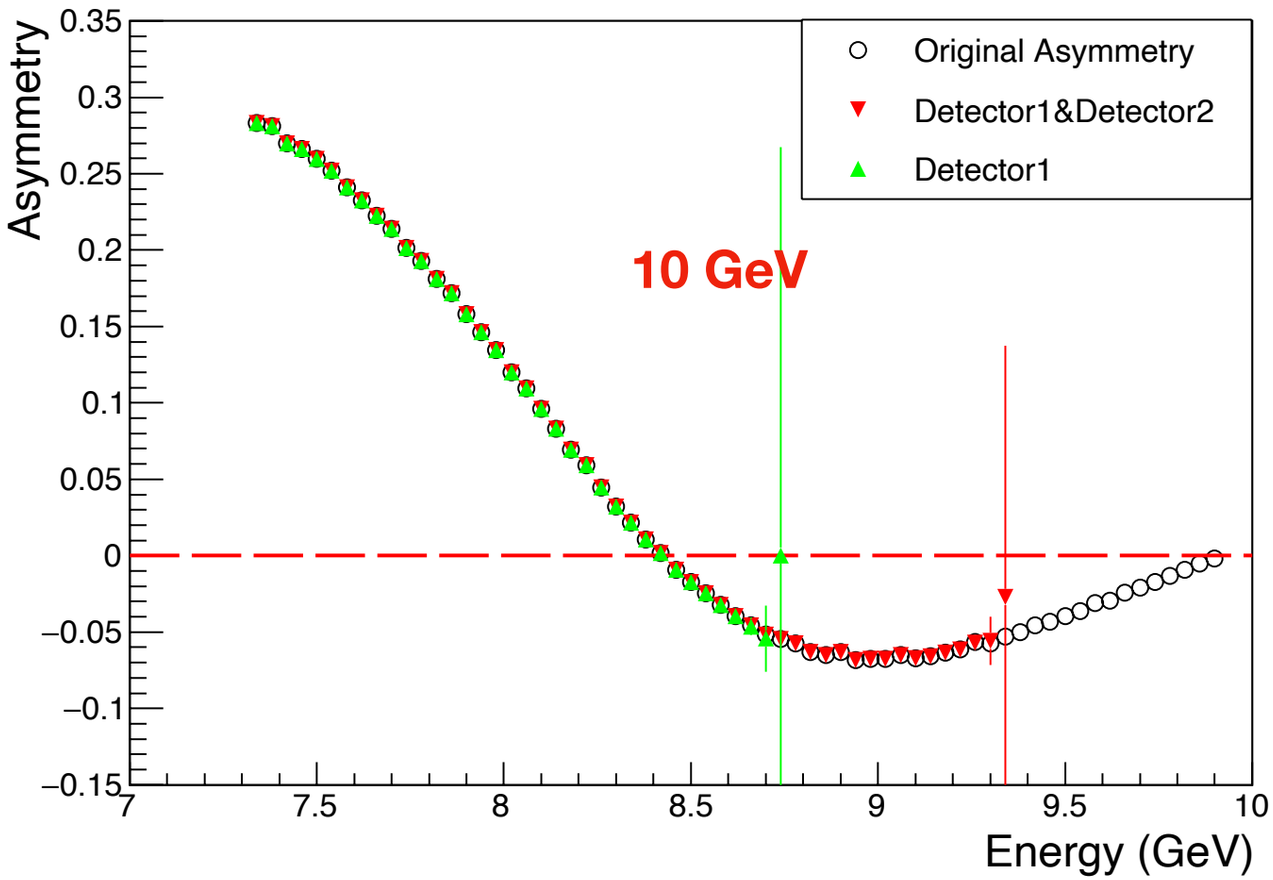
- Placing the electron detector before Q5 allows us to detect 'zero-crossing' at all energy levels including 5GeV in our current lattice setup.
- However for 18GeV, the wide spread of recoil electrons may lead to significant detection loss due to quadrupole aperture limitations. Hence, we're considering positioning the detector before Q6 to better capture 'zero-crossing' for 18GeV and 10GeV.
- After collaborating with Daniel, we've determined that using a single detector before Q6 is not feasible for capturing the 'zero-crossing' for 5GeV. We are now considering a two-detector configuration, positioning one detector each before Q6 and Q5.
- For synchrotron radiation in our current setup, a 1.0mm tungsten shield is required, just as we expected.
- We have finalized the lattice setup for our polarimeter at ESR. The latest files are available on Github (TwissFiles) **https://github.com/ZhengqiaoZhang/ComptonPolarimeter.git**

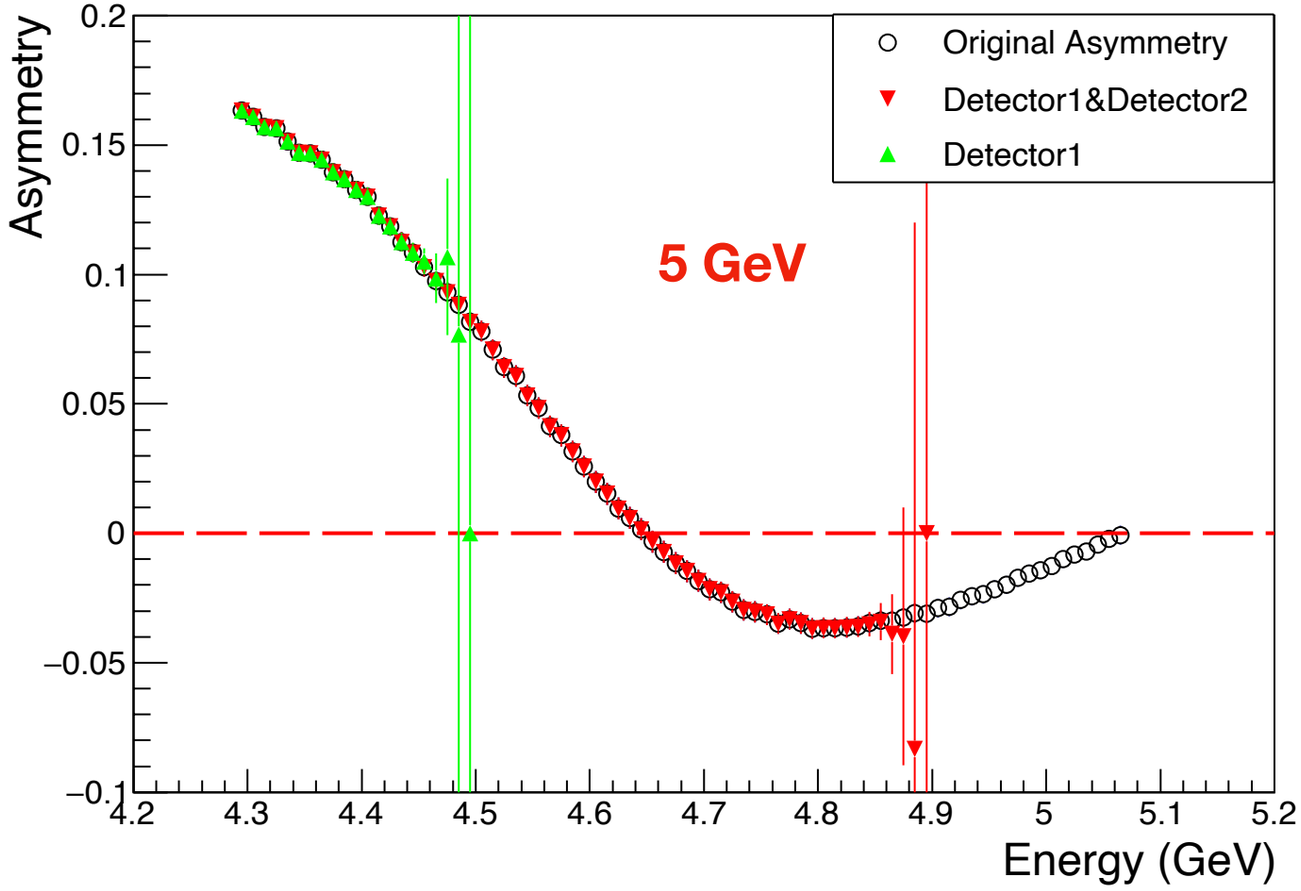




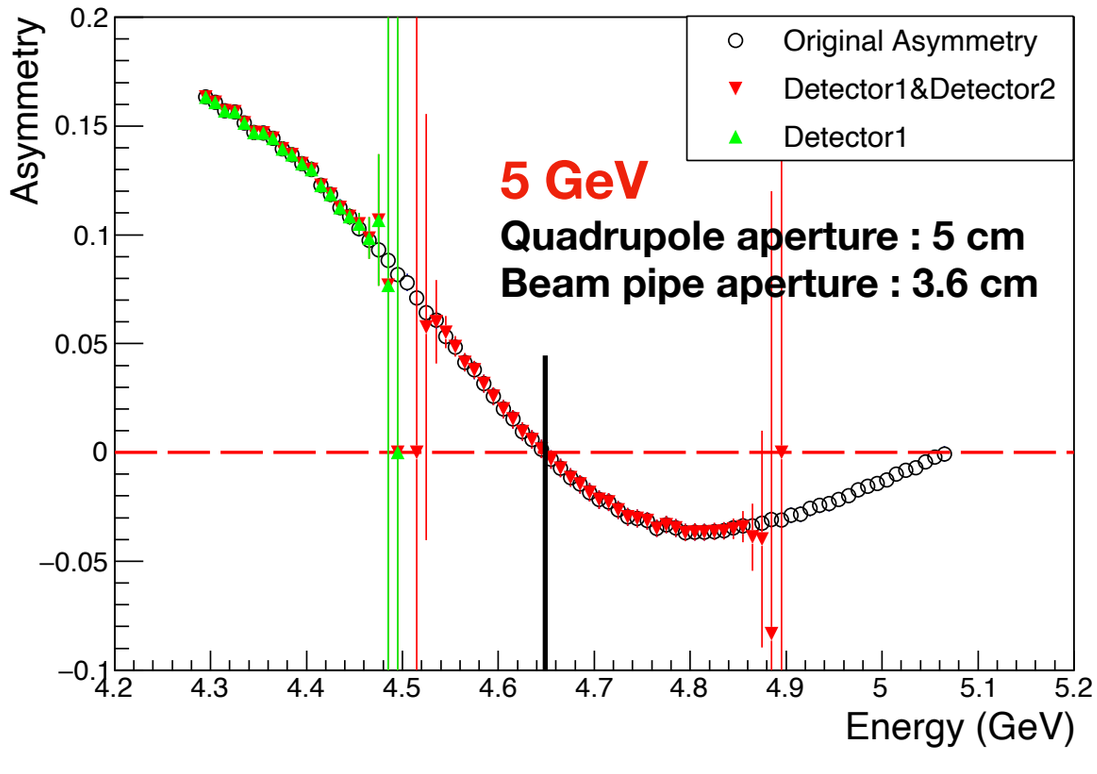
- **Placement of Detectors:**
  - Detector1 is positioned 0.5 meters upstream of QD6.
  - Detector2 is positioned 0.5 meters upstream of QF5.
  - Beam pipe aperture : 3.6 cm
- **Detector1:**
  - The minimum width of Detector1 is set at 8.2 cm. This specification is based on the spread of recoil electrons generated by an 18 GeV beam.
  - Detector1 effectively captures the majority of recoil electrons and covers the ‘zero-crossing’ point in the asymmetry.

Note: 'zero-crossing' is meant in its literal sense, meaning the point where Asymmetry equals zero!





- **10 GeV Detection with Detector1:**
  - Detector1 effectively covers the 'zero-crossing' point of the asymmetry at 10 GeV.
- **5 GeV Detection Challenges and Solutions:**
  - At 5 GeV, Detector1's coverage is limited and insufficient to capture the 'zero-crossing'.
  - By integrating Detector2, we can extend the range to include the ‘zero-crossing'.
  - A simpler solution might be to have Daniel adjust the 5GeV beam parameters to increase Detector1's coverage, aiming to capture the ‘zero-crossing' (not feasible after we discussed).
- **Impact of Quadrupole Aperture Size:**
  - Currently, the quadrupole aperture size is adequate at 12cm.
  - A reduced aperture size (e.g., 5cm) would result in loss of some acceptance, as demonstrated in the figure (bottom right).



Next work:

- The detailed detector simulation with the exit window and W shield;
- The the beam pipe design for the electron detector;