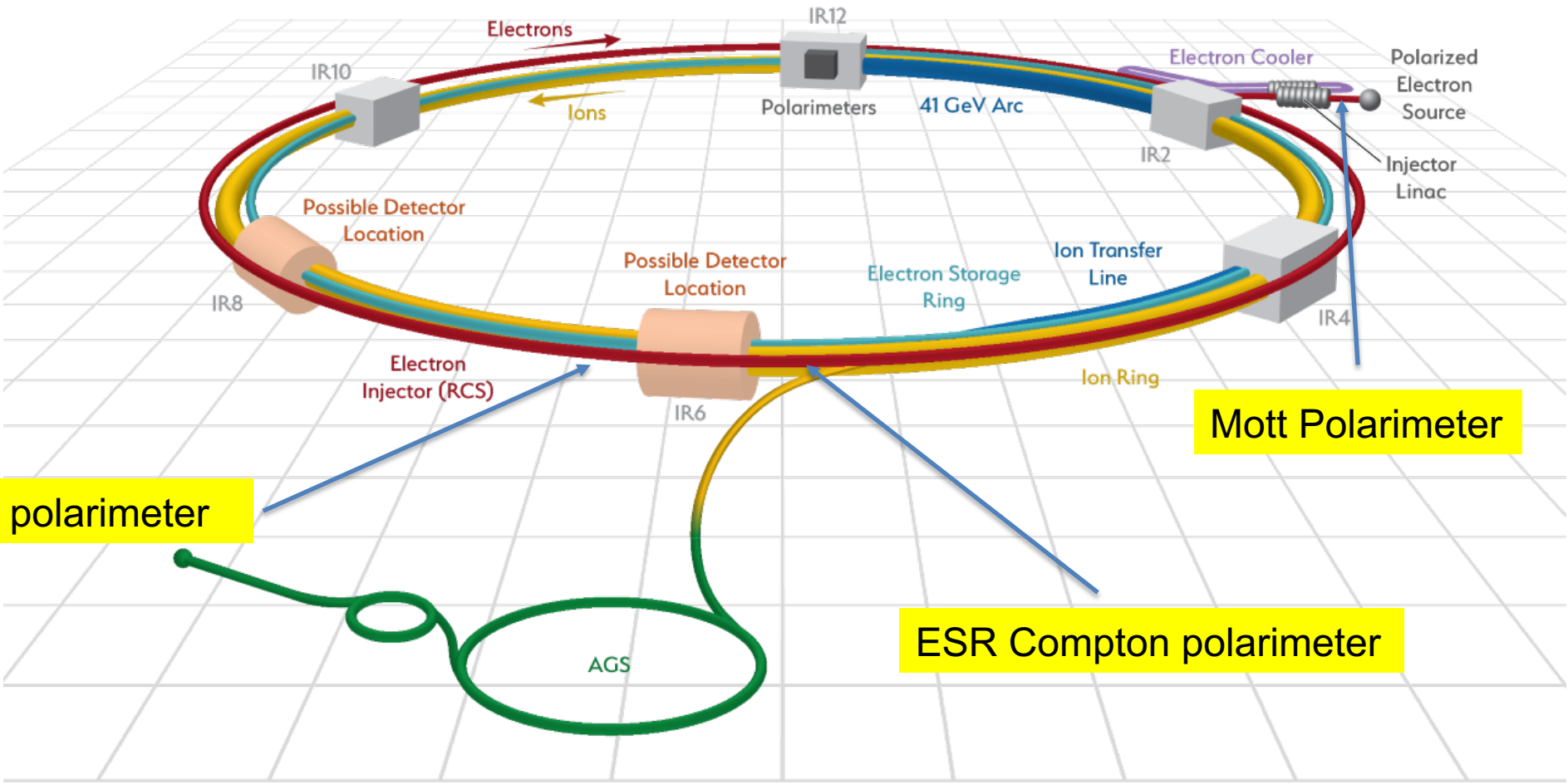
Electron Polarimeter Locations



Mott Polarimeter

RCS Compton polarimeter

ESR Compton polarimeter

RCS Compton Polarimeter

RCS properties

- RCS accelerates electron bunches from 0.4 to full beam energy (5-18 GeV)
- Bunch frequency → 2 Hz
- Bunch charge → up to 28 nA
- Ramping time = 100 ms

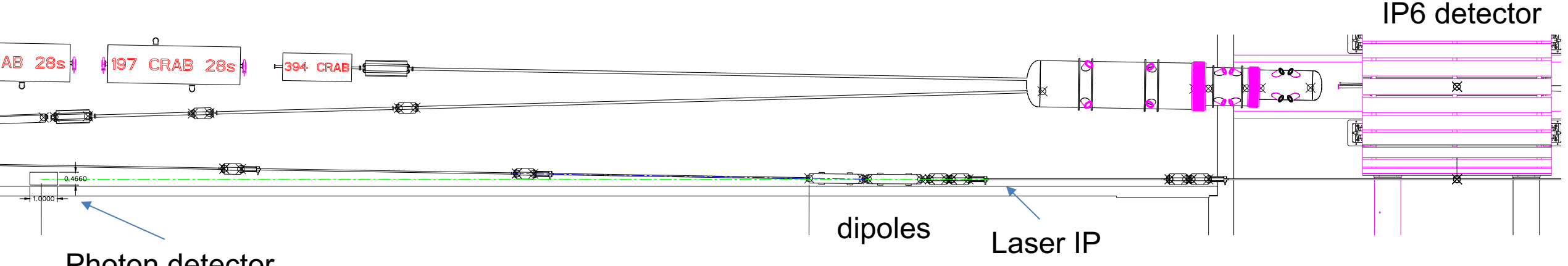
Polarimetry challenges

- Analyzing power often depends on beam energy
- Low average current
- Bunch lifetime is short

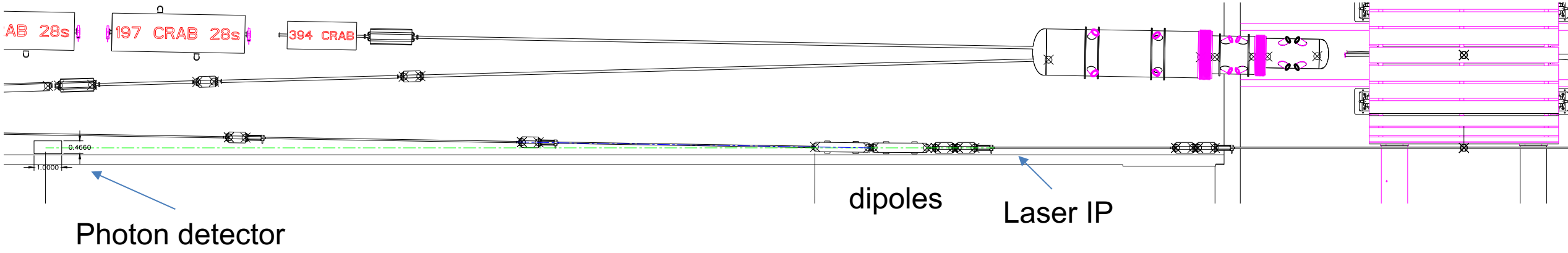
Compton polarimeter can also be used for measurement of polarization in RCS

→ Measurements will be averaged over several bunches – can tag accelerating bunches to get information on bunches at fixed energy

→ Requires measurement in multiphoton mode (~1000 backscattered photons/crossing)



RCS Integration



Location requirements:

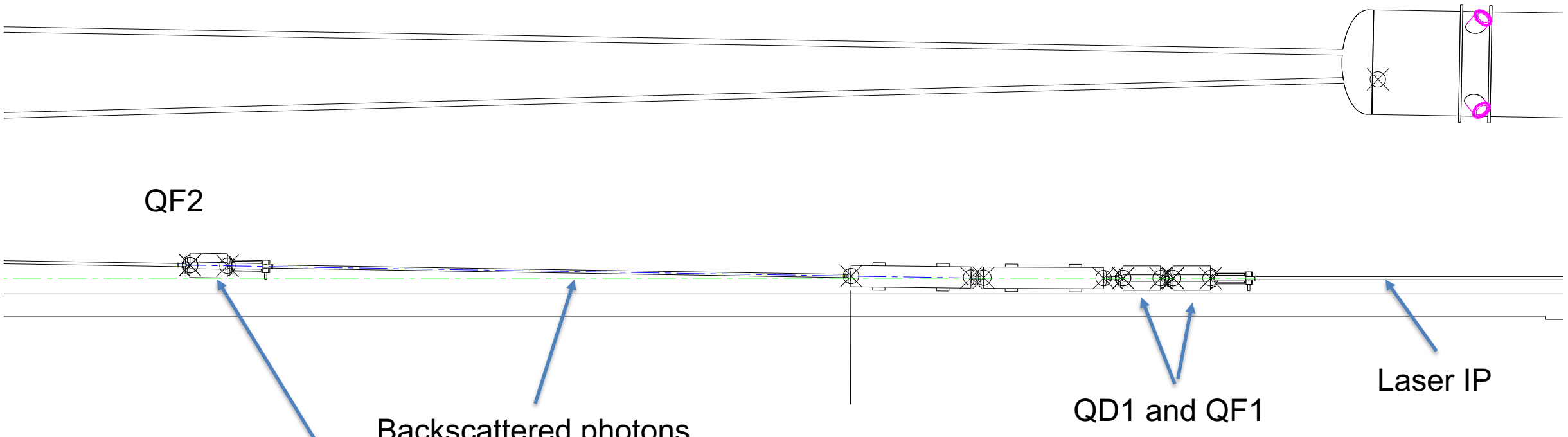
→ Space upstream of one or more dipoles for laser

→ Long drift to photon detector with minimal beamline elements (would like to avoid drilling holes in magnets)

→ Space for photon detector

→ Vertical polarization in RCS – can't use electron detector so no need for special location for it

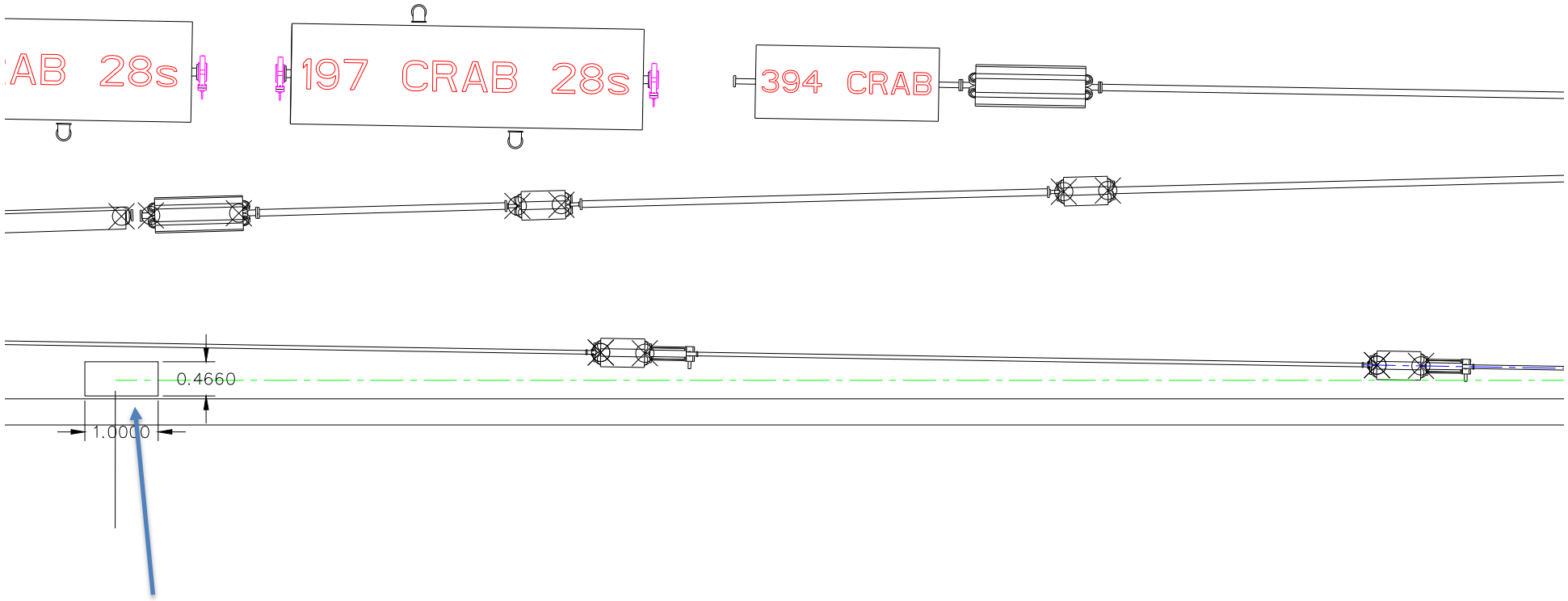
RCS Integration



1.5 mm from edge of QF2 to photon centerline
→ Likely need some modification to quad, or relocation?

Laser IP close enough to QD1 and QF1 that backscattered photon cone will clear aperture

RCS Integration



Assuming 10 cm wide photon detector, about 10 cm clearance between beam pip and edge of detector

Photon detector 27.8 m from end of 2nd dipole – similar drift as ESR Compton

RCS Integration To-do

- Address possible clearance issue at QF2 → photon cone estimates, possible quad modification
- Get beam size, divergence at proposed laser IP → verify that rates OK
- Determine location of photon exit window
- Further future
  - Detailed integration of laser system
  - Realistic photon detector system/stand in model