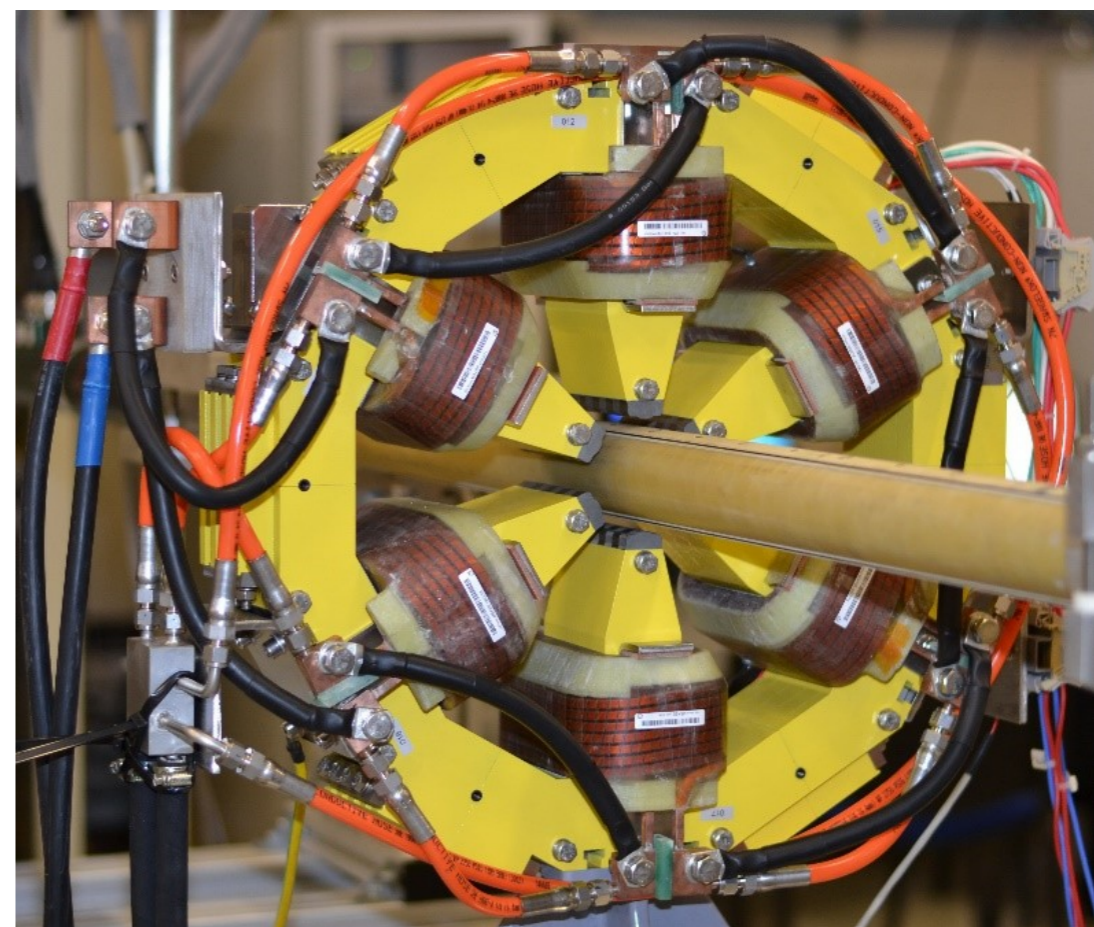

Integration Challenges: Compton Polarimeter and EIC Component Conflicts

Zhengqiao Zhang

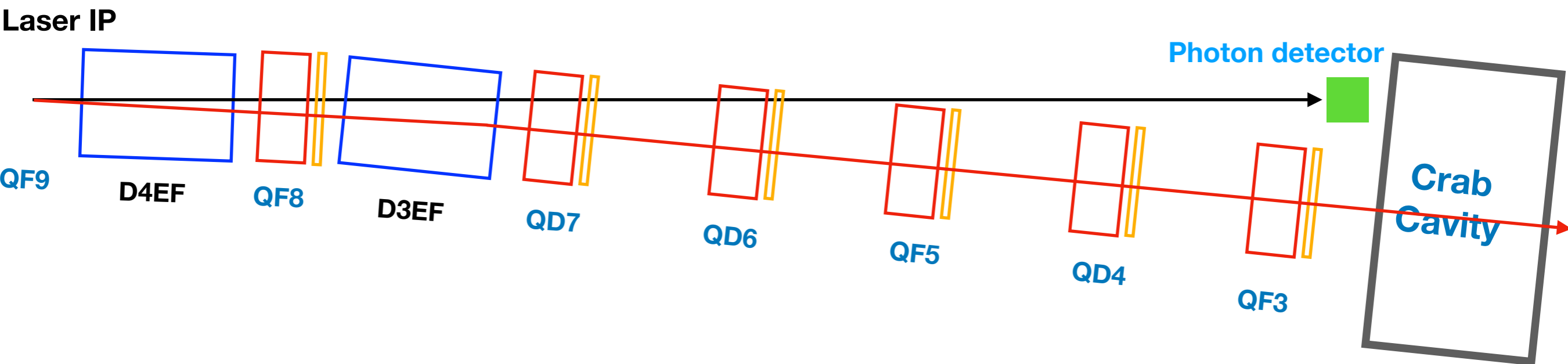
02.05 2025

Constraints for skew quadrupoles

- Yun Luo, the EIC accelerator expert, asked about constraints from Compton polarimeters on placing skew quadrupoles at IR6.
- Quadrupole and sextupole magnets are located between the laser IP and photon detectors. These magnets have a clear midplane (XZ plane), allowing scattered photons to pass through.
- Skew quadrupoles a variation of a quadrupole magnet which is rotated by 45 degrees relative to the normal quadrupole orientation. Unlike normal quadrupoles, they lack a midplane, which may obstruct scattered photons.



Constraints for skew quadrupoles



- Due to the limited space between the crab cavity and Q3EF_6—where the photon detector will be placed—a skew quadrupole can only be positioned here if it is compact and placed close to Q3EF_6.

For reference, we assume the inner radius of the skew quadrupole is **3.5 cm**. Placement in other regions is subject to the following constraints:

- **Between Q9EF_6 and D3EF_6:** Skew quadrupoles can be freely placed.
- **Between D3EF_6 and Q6EF_6:** Skew quadrupoles are not permitted due to the inner radius (due to the inner radius constraint, as the offset between the photon trajectory and the beamline exceeds 3.5 cm).
- **Between Q6EF_6 and Q5EF_6:** Skew quadrupoles are allowed if their outer radius is **less than 12 cm**.
- **Between Q5EF_6 and Q4EF_6:** Skew quadrupoles are allowed if their outer radius is **less than 18.5 cm**.
- **Between Q4EF_6 and Q3EF_6:** Skew quadrupoles are allowed if their outer radius is **less than 27 cm**.

Discuss this topic with Yun Luo tomorrow

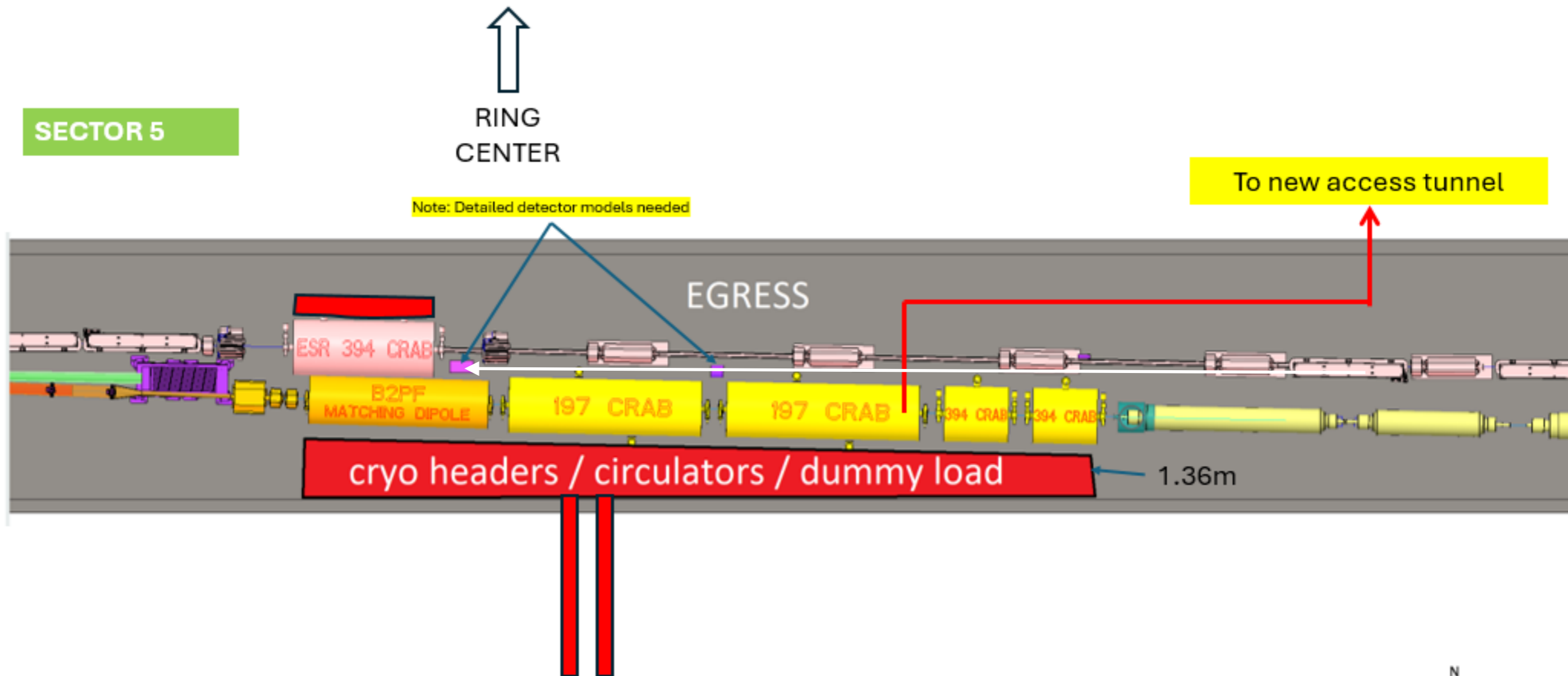
EIC coupling compensation meeting is on Thursday, Feb. 6, 2-3pm. The zoom meeting link is:

Join Zoom Meeting

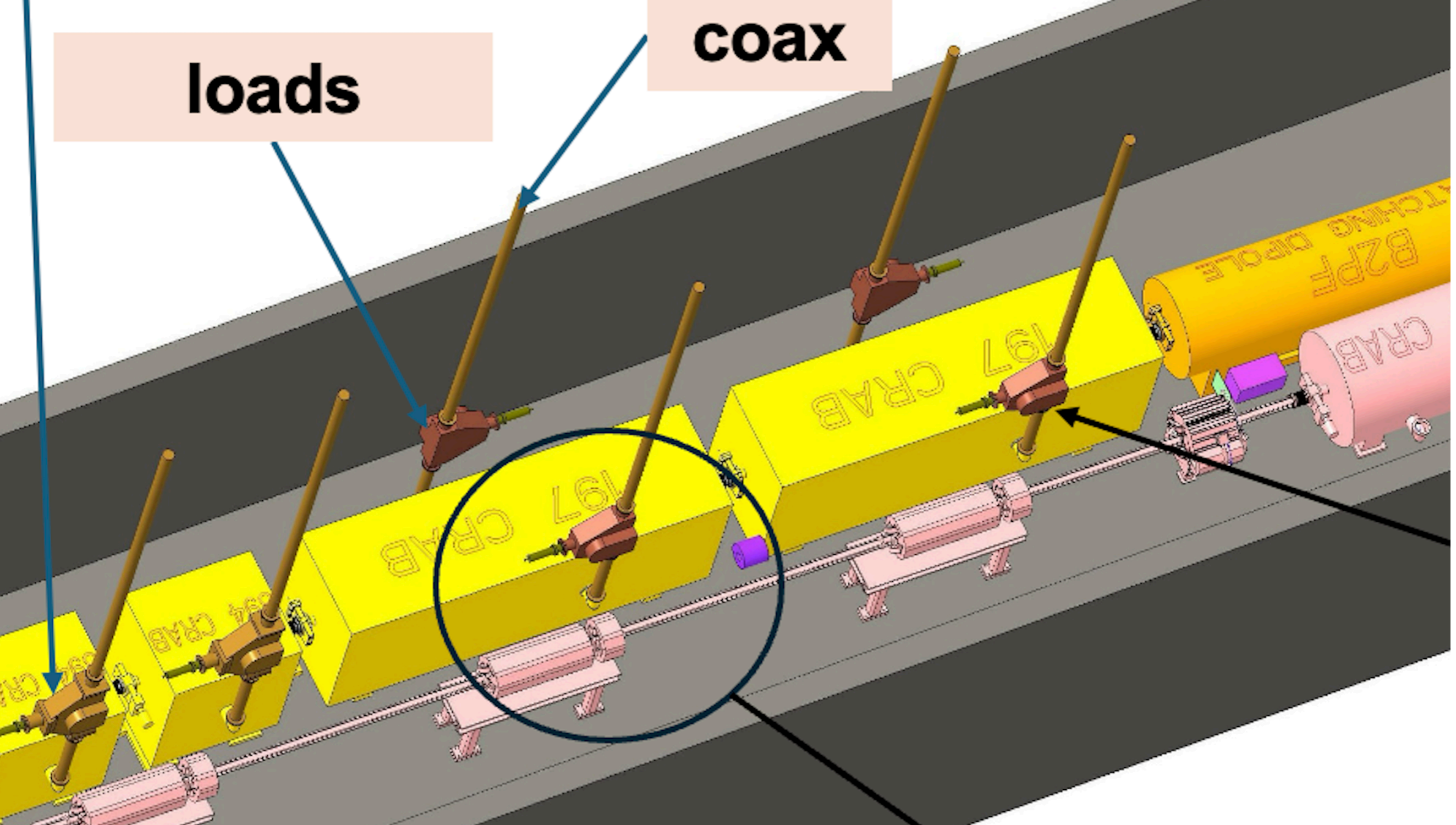
[https://bnl.zoomgov.com/j/1602764865?
pwd=SmhxbDcbKOUPrAaeNs6jvzVr04LbqG.1&from=addon](https://bnl.zoomgov.com/j/1602764865?pwd=SmhxbDcbKOUPrAaeNs6jvzVr04LbqG.1&from=addon)

Meeting ID: 160 276 4865
Passcode: 824083

Space Constrains Between the Hadron Crab and the Photon Trajectory



Karim Hamdi discussed the most constrained areas in the IR-6 during the last IR meeting. It appears that the edge of the hadron crab cavities is very close to the photon trajectory of the Compton polarimeter.



- Generate the photon cone as a solid object in CAD format, allowing Karim to check for overlaps.
- Update the Compton polarimeter components with more details, including: support structures for the photon and electron detectors, as well as the collimator.
- A more detailed CAD model of the laser system.

Thanks!