Far Backward (Luminosity) WG

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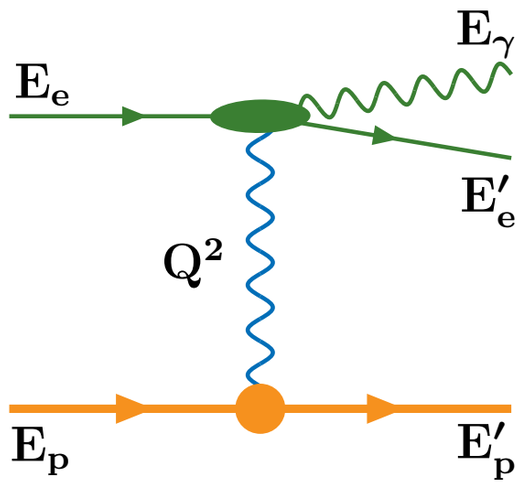
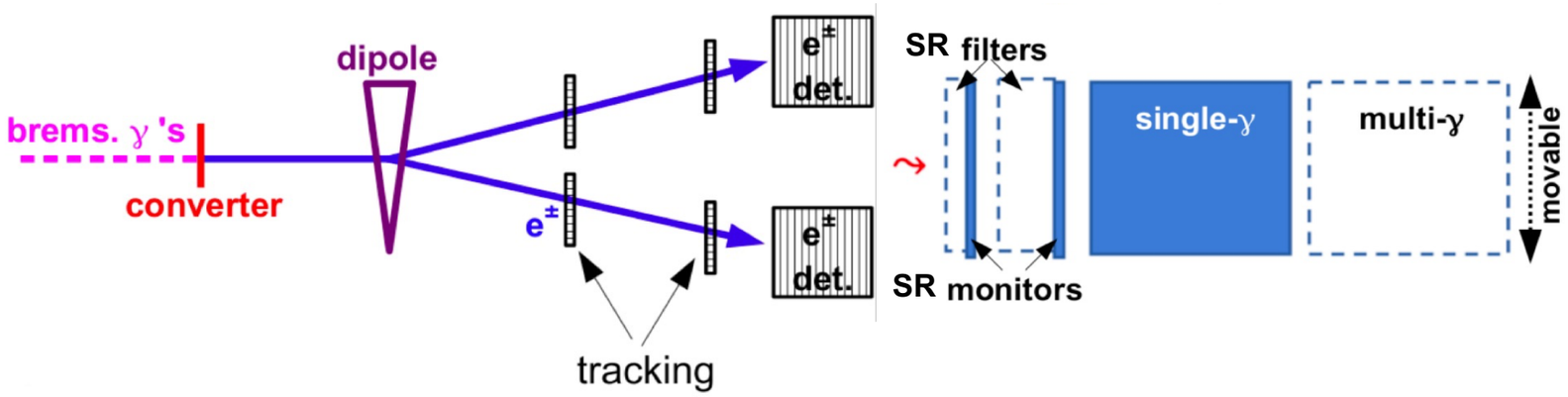
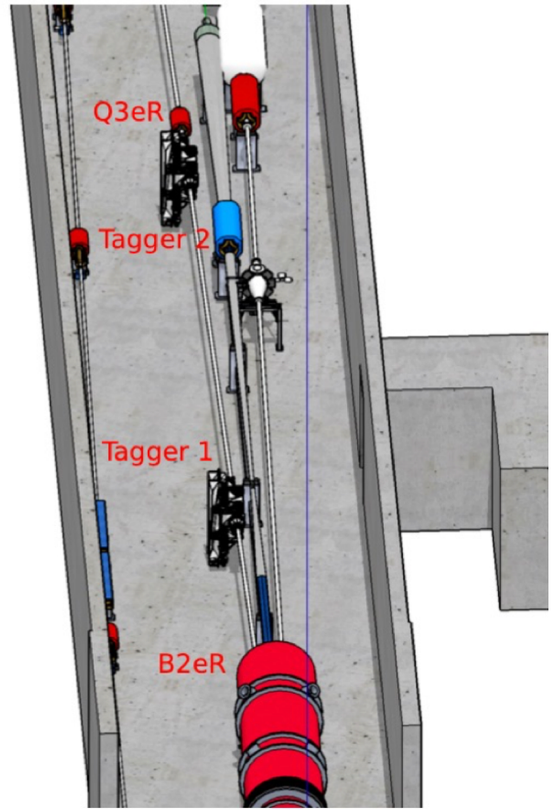


Far Backward Layout/Inventory

"Photon branch"



"Electron branch"



Photon detectors: SPECT for converted photons = 2 calorimeters + trackers;
Direct photon detectors = 2 movable calorimeters (or just 1?)

Two far backward electron stations *aka* low-Q^2 *taggers*:
2 calorimeters + trackers

ECCE vs. ATHENA Designs

Calorimeters: similar dimensions but different technologies,

$PbWO_4$ crystals with 6.5 ns scintillation decay time vs. Tungsten/Scintillator Fiber spaghetti calorimeter (SCal) with about 2 ns decay time

ATHENA proposed a special calorimeter for direct photons at high luminosity – a Tungsten/ Quartz Fiber SCal with < 1 ns "decay time" and very high radiation hardness

ATHENA also proposed dedicated SR monitors using similar quartz sensors

Trackers (SPECT+Taggers): similar lateral dimensions but different technologies,

Pixel AC-LGAD trackers vs. hodoscopes made of scintillating fibers

Both proposed an about 60-cm long dipole magnet (ECCE considered a stronger field)

"For each non-trivial difference working groups will then work to prepare a pro/con list accounting for technical performance, risk and cost. The resolution of non-trivial differences should be discussed in close consultation with the Global detector/integration WG, physics working groups, the EIC project, relevant detector consortia and R&D efforts."

- Discussion of pros and cons for having dedicated system for the high and low luminosity runs
- Discussion of synchrotron radiation monitoring – this might be imposed by machine group
- Pros/cons on AC-LGADs
- Discussion on magnet (strong magnet needs cryostats and space is restricted)
- Vacuum designs – under study

"What are the resources needed to address these issues? In addition to R&D and simulations, please highlight any additional resources that will be required. Are there missing resources or information the SC should be aware of?"

Further versatile and extensive simulation efforts:

- Study the time response of $PbWO_4$/light collection – address high channel occupancy issues
- Implement the full calorimeter simulations – address high rate and radiation hardness issues
- Study performances of SR Filters and SR monitors
- Optimize the magnet design
- Low-Q^2 tagger studies MAPS/Timepix4/AC-LGADs – address SR hit rate
- Are calorimeters for low-Q^2 needed?
- Optimization of position of low-Q^2 taggers/trackers (position and distance)
- Address readout/data acquisition issues – analyze the necessary data flow
- … and MANY MORE

“What are the timescale(s) for resolution? What drives the timescale(s)?”

- Timescales are not clear yet. Discuss that we should have a bit more time to perform all necessary studies – IR not fixed yet – more coupled to machine designs than the Central detector.
- The Far Backward detector designs are highly nontrivial due to high precision requirements for a wide electron beam energy range (SR!) and variety of ion beams (event rates!)
- Might profit from synergies with the electron polarimeter project

“How are the Physics Working Groups integrated into your detector working group efforts?”

At high luminosity the low-Q^2 tagging is very challenging, due to the bremsstrahlung overlays, especially in case of heavy ion beams – in particular, we need to know what tagging “purity” is acceptable for Physics WGs