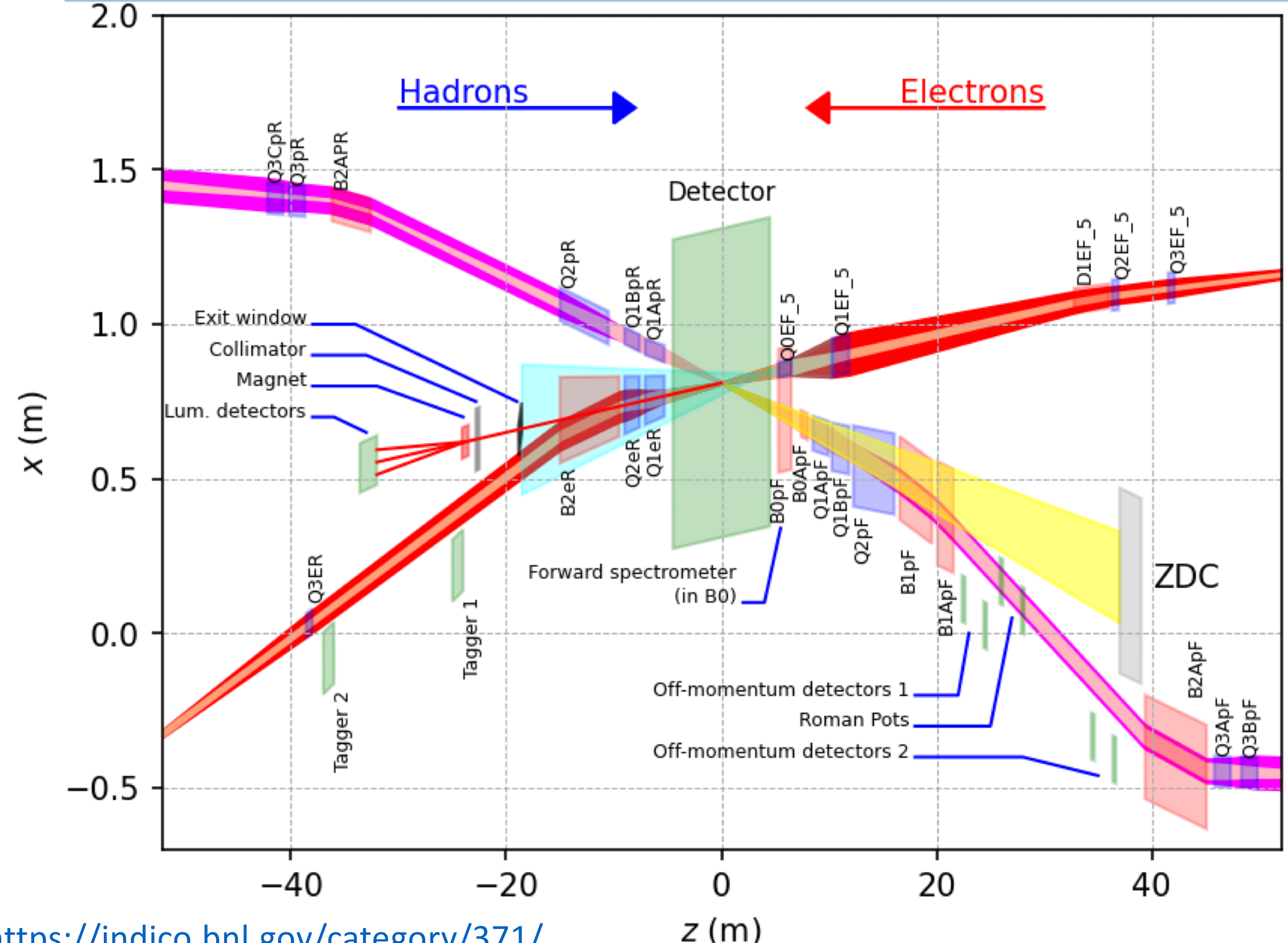
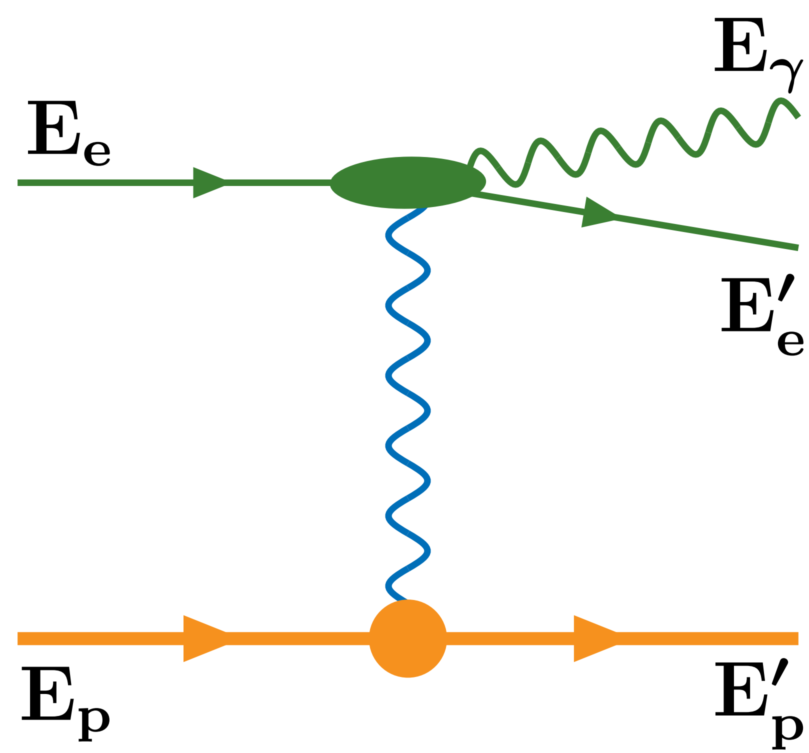
Athena FarBackward Proposal:

DAQ discussion



Top view of the IR6

in Athena coordinates



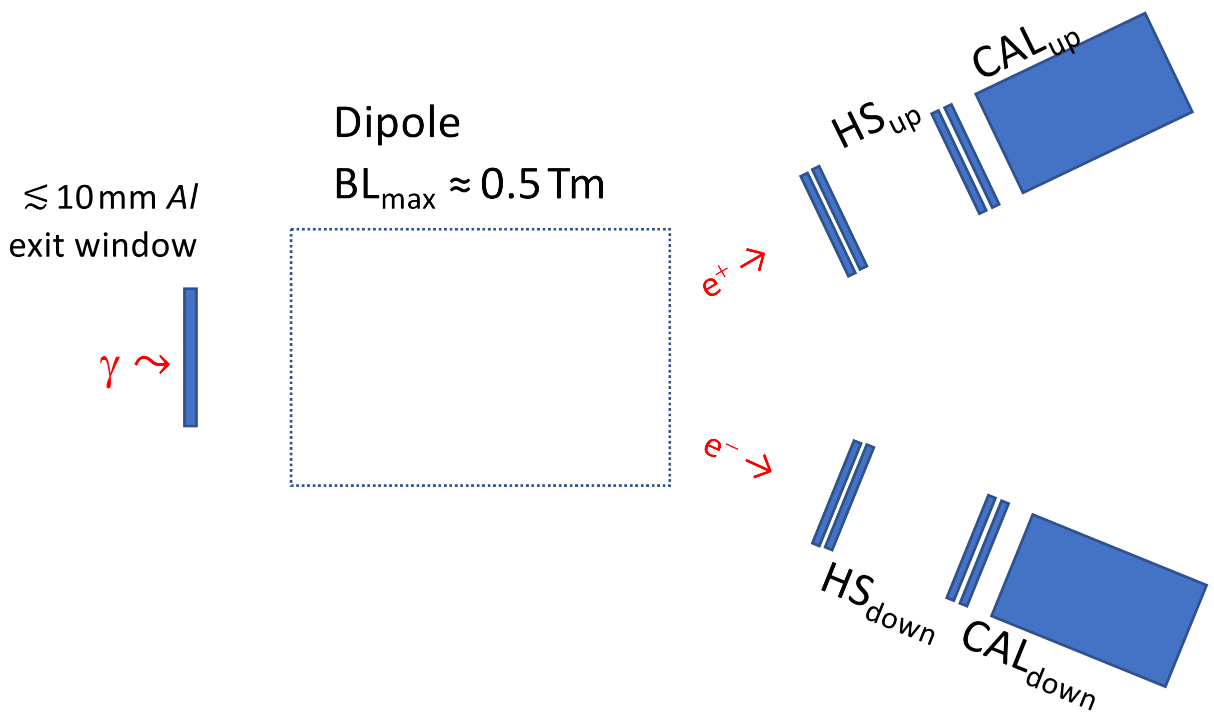
https://indico.bnl.gov/category/371/

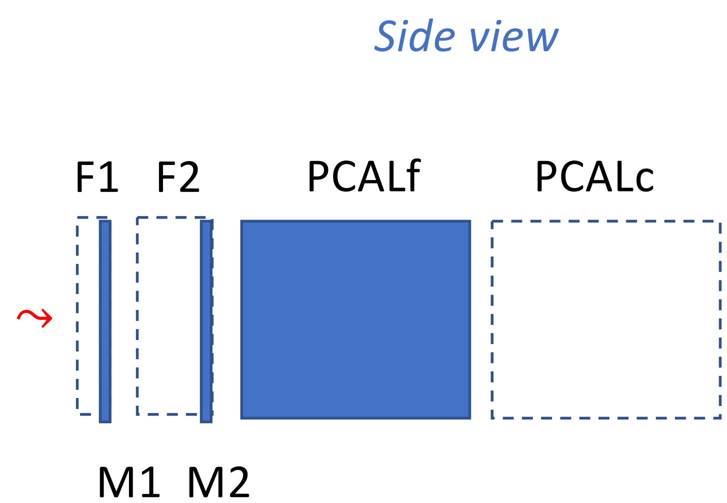
https://lists.bnl.gov/mailman/listinfo/eic-ip6-det-back-l (21)

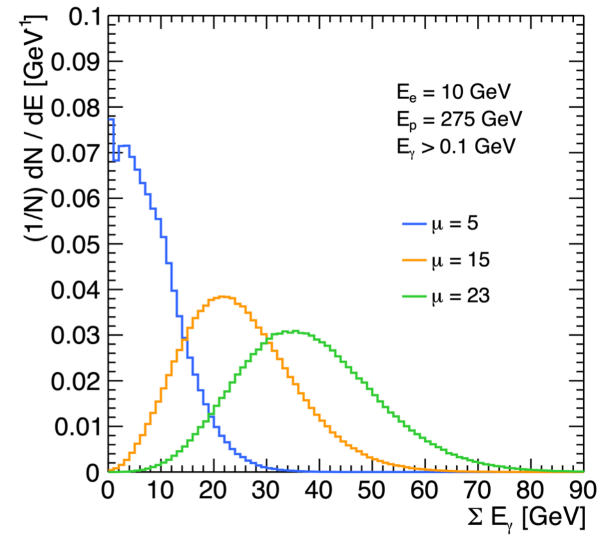
FarBackward Proposal: three luminosity methods

Three largely complementary **bremsstrahlung** measurements:

1. *Reference* measurement – photon counting with a (movable) calorimeter PCALc, only at *low L* – but with the bremsstrahlung event rates up to 100 MHz
2. Photon conversion **counting** using $CAL_{up/down}$ + $HS_{up/down}$ (outside SR fan) – with the event rates above 100 MHz for *eAu* collisions
3. Photon **energy flow**, or $\langle E_{PCALf} \rangle$, using a movable calorimeter PCALf, with SR filters/monitors in front







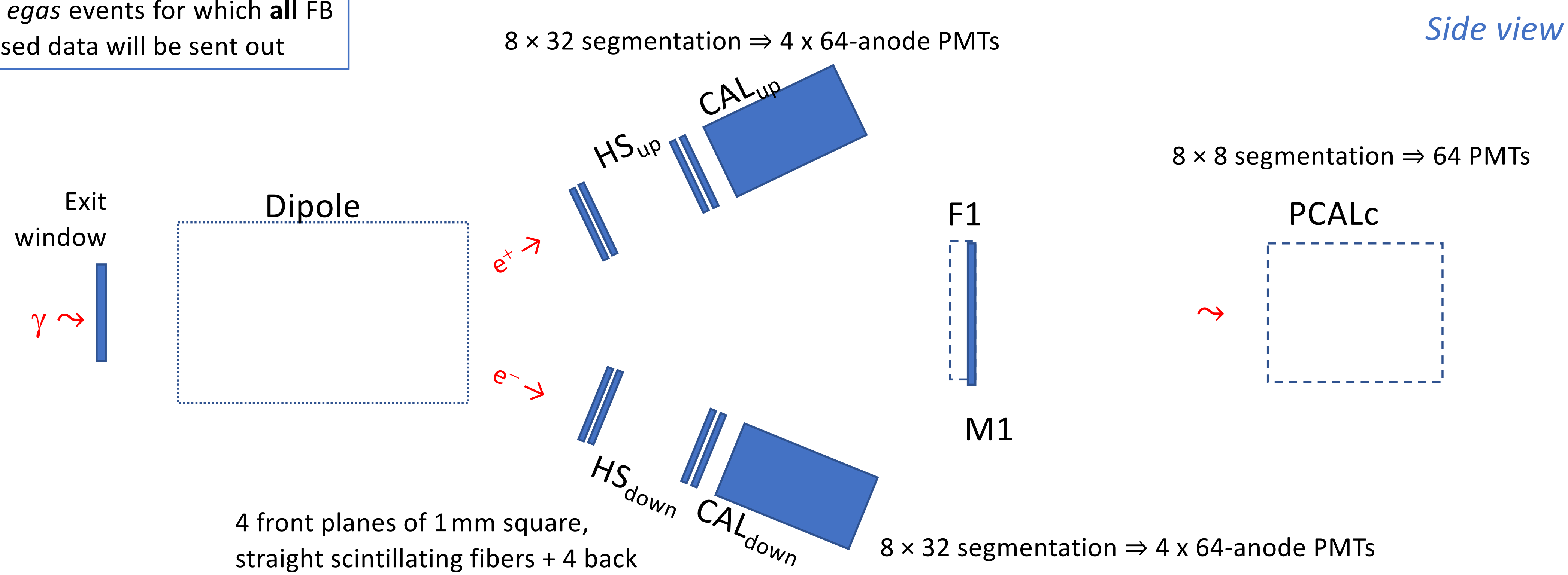
FarBackward proposal: $CAL_{up/down}$ + PCALc (+ PCALf)

$CAL_{up/down}$ and $HS_{up/down}$ *ep* event rate will reach 10 MHz – **all zero-suppressed data** will be sent to the central DAQ system to build full spectrometer events, with the data stream of about 2 × (80 b + 120 b) × 10 MHz = 4 Gbps (it becomes about 60 Gbps for *eAu*)

For PCALc the maximal rates will be similar, so its data flow = 64 × 10 b × 10 MHz = 6.4 Gbps

("by construction" PCALf and M1/M2 see (multiple) events every bunch-crossing – except for the FB calibration events**, all its data will be processed **locally** – only **very large number of histograms** will be sent out.

) mostly small rate *egas* events for which **all FB detectors' unsuppressed data will be sent out



4 front planes of 1 mm square, straight scintillating fibers + 4 back planes of 2 mm fibers, all read out by SiPMs – **about 800 channels** in total.

FarBackward Proposal: Bremsstrahlung electrons & photoproduction tagging

Electron calorimeters $ECAL_{1/2}$ and HS_{e1} + HS_{e2} will see ***ep*** **event rates** even beyond 100 MHz at the nominal luminosity, what results in a huge (bremsstrahlung) data flow well above 2 × (80 b + 120 b) × 100 MHz = 40 Gbps.

Bottom-line: a total throughput of **at least 80 Gbps is needed for the FB detectors** (with a small fraction used for sending out highly processed luminosity data) – and, assuming the SR background can be neglected.