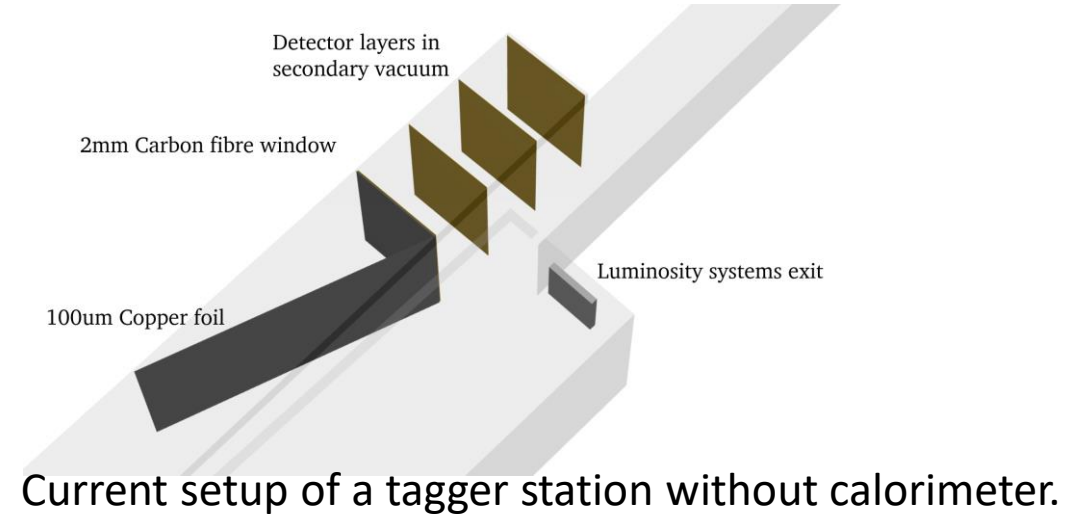
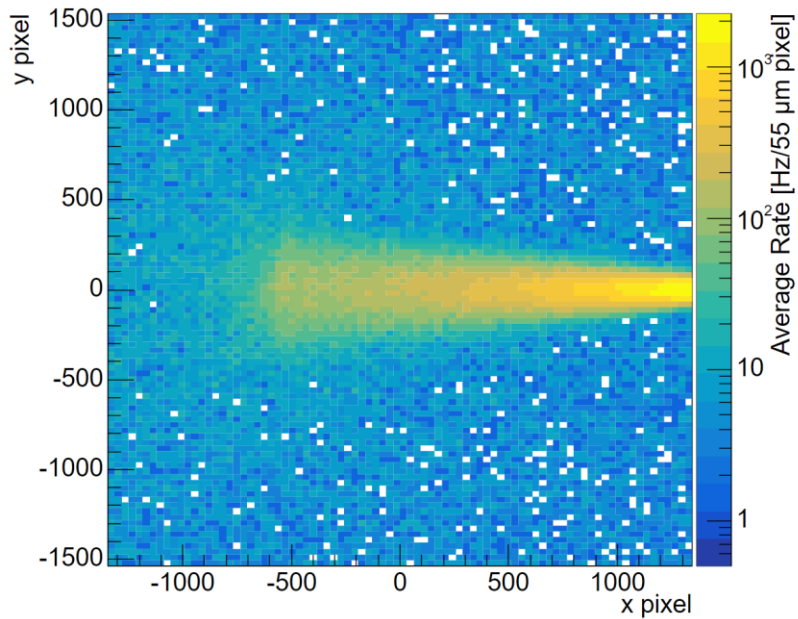


Low-Q2 reconstruction in EICrecon

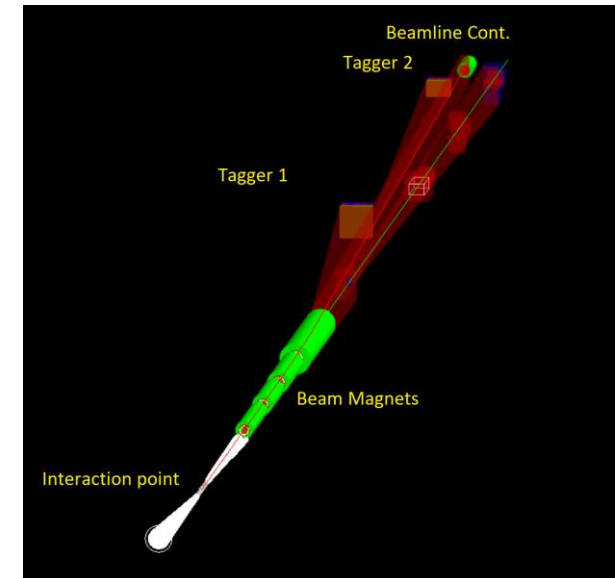
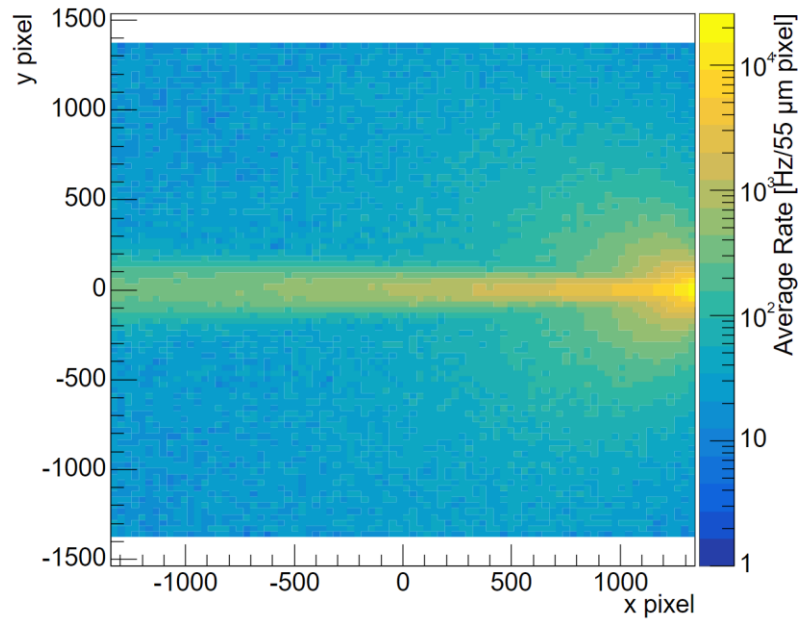
- ePIC simulation outputs “TaggerTrackerHits” collection
- Segmentation:
 - 2 tagger stations/modules
 - each with 4 layers
 - x/y segmentation of 55 μ m
- Events rate:
 - Focussed in narrow band for lowest Q2 events and Bremsstrahlung
 - Spread along the band, separated by energy by dipole fields



Tagger module 1, layer 0 - Mean Bremsstrahlung rate per 32x32 pixel group



Tagger module 2, layer 0 - Mean Bremsstrahlung rate per 32x32 pixel group



Older image showing the electron and photon paths from a Bremsstrahlung event

Reconstruction of Low-Q2 events - Checklist

Simulation

- Make sure you run the correct beamline settings for your event sample e.g.
 - “`ddsim -compactFile epic_craterlake_18x110_Au.xml`”
- If you need a custom configuration this will need to be added/handled manually

```
epic_craterlake_10x100.xml  
epic_craterlake_18x110_Au.xml  
epic_craterlake_18x275.xml  
epic_craterlake_5x41.xml
```

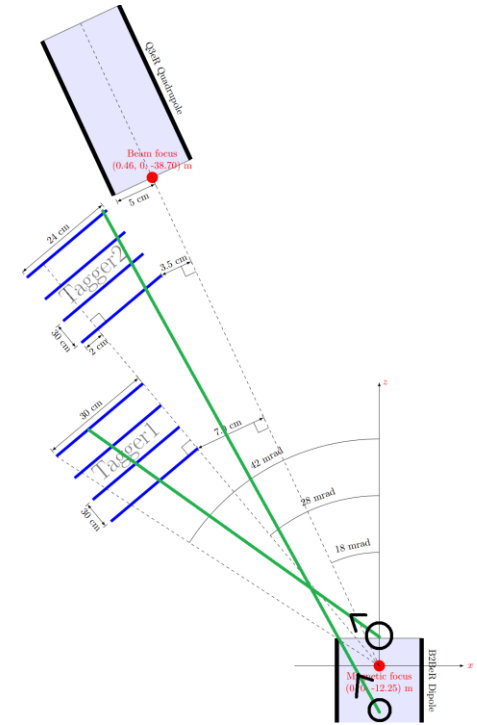
Reconstruction

- Currently full reconstruction only on branch:
 - [eic/ElCrecon at 266-integrate-lowq2-tagger-reconstruction \(github.com\)](https://github.com/eic/ElCrecon/tree/266-integrate-lowq2-tagger-reconstruction)
- To control what beam energy was used in the simulation you need to add:
 - `-PLOWQ2:LowQ2Trajectories:electron_beamE=10`
 - Just scales momentum of reconstructed vector by the beam energy.

The hope is as much of this as possible will be controlled automatically without removing the ability to do custom settings

Output

- Several new collections should be output
 - “TaggerTrackerRawHits” – simple digitization model
 - “TaggerTrackerClusterPositions” – Clustered hit position (Charge sharing not currently implemented so a bit pointless)
 - “LowQ2Tracks” – Vector and position associated with a chi2 fit to 4 clusters from each layer
 - “LowQ2Projections” – Track vector projected onto common plane
 - “LowQ2Trajectories” and “LowQ2TrackParameters” – Output from ML reconstruction algorithm
 - “CombinedTrajectories” – Subset collection containing hits from both central and Low-Q2 trajectories
- Combined trajectories is fed into the InclusiveKinematics factories – These currently need proton/neutron PGD for a beam particle to be filled.



Benchmarks

- Benchmarking scripts available in branch:
 - [detector_benchmarks/benchmarks/LOWQ2/analysis at add_lowq2_benchmarks · eic/detector_benchmarks \(github.com\)](https://github.com/lowq2/benchmarks)
- Can provide, acceptance, rates and reconstructed resolutions.

