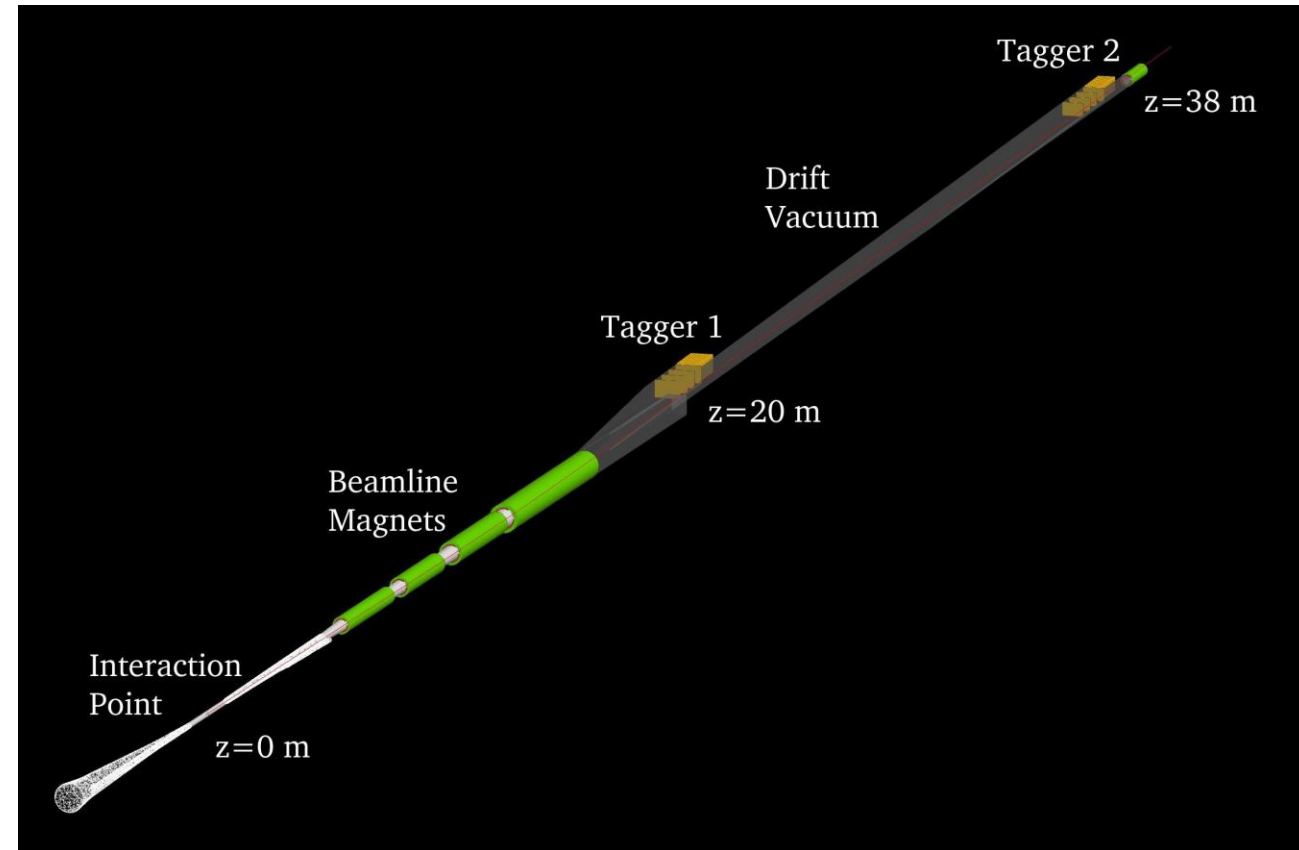# TIC Meeting 21st August 2023
Low-Q^2 : High-Rate Trackers

1. Integration with Accelerator

2. Backgrounds

3. Reconstruction and Benchmarks

Jaroslav Adam – Project Lead
jaroslav.adam@fjfi.cvut.cz

**Simon Gardner** – Technical Lead
Simon.Gardner@glasgow.ac.uk

Integration obstacles

Beampipe and exit window design

- Better understanding of where issues lie but still no notable studies made in the last year(s).
- Exit window thickness and angle –Thin with secondary vacuum?
- Thin foil/grid inside beam vacuum at larger angle to reduce impedance effects
- SR background from scattering expected to be high - mitigation with antechambers?

Calorimeter inclusion

- Allows essential cross calibration of tracker and luminosity system during low current runs
- Extra material for backscattering.

Timepix4

Thin window

Beam vacuum

Secondary
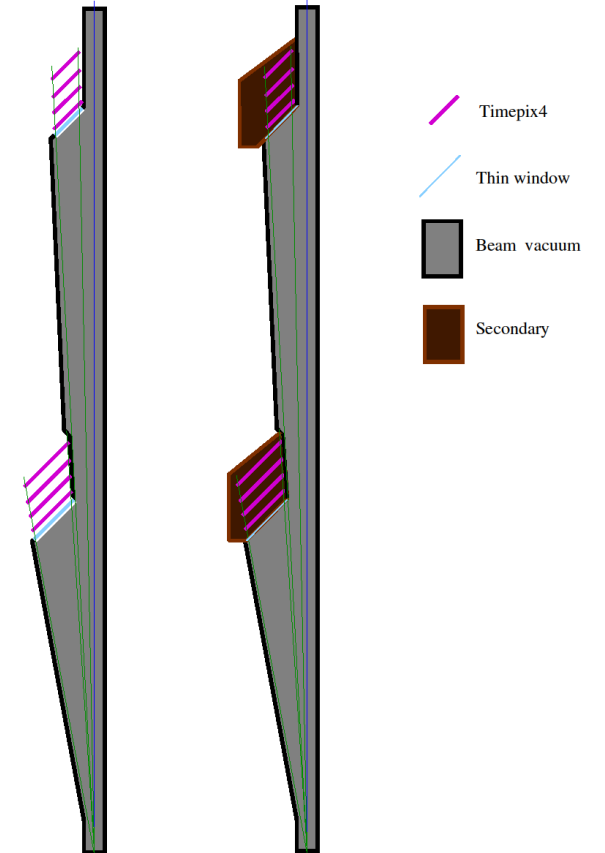
Background Inclusion – Required Improvements

<u>Bremsstrahlung is not being included as a background</u>

Essential to be able to fully develop and understand reconstruction behaviours.

18.7 Bremstrahlung interactions per bunch crossing @ 18x275 GeV with e- energy >0.1 GeV.

Additional 18700 electron-photon pairs per event for 10us integration window.

Lots of extra particles to slow down the simulation

There are alternative implementations but are they worth it?

- Sum from sample of after simulation – clumsy or complicated with podio
- Only include Brem sample from bunches around signal – Might create analysis artifacts

<u>Background sample generation stops at the end of the central detector</u>

Extended Electron Beam Gas and Synchrotron radiation samples essential to understand rates.

<u>Background sample generation is spread uniformly throughout time</u>

Fine for long integration time detectors but not for fast timing detectors.

Currently any time dependant analysis would result in huge over/under estimate of background.

Beam gas and synchrotron interactions need their time to be correlated with a bunch passing generated location.

Reconstruction and Benchmarks

Still working towards including reconstruction in EICrecon

Moving to algorithms and EDM4eic/hep datamodel structures to line up with philosophy.

Currently no structure appears to hold array of raw tracker hits to use as cluster.

Discussions pending on how to use ML code/where to put (larger) weight files.

Replication of Far-Forward Transfer matrix method intended alternative.

User ease of use improvements through metadata

Intended use metadata to make it difficult to run with different beam/magnet settings for:

- Generation
- Simulation
- Reconstruction

Currently quite a confusion for getting new people up to speed.

Benchmarks

Detector benchmarks hopefully available in EICrecon soon…