Simulation tools from the YR

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Geant4 from YR, luminosity side

- A framework for acceptance studies, details are in indico.bnl.gov/event/8746/contributions/38747/attachments/28859/44620/JA-Luminosity_and_tagger_20200618.pdf

- Exit window is 1 mm thick aluminum, 100 mrad tilt vs. electron beam axis (and bremsstrahlung photons)
- Dipole magnet and beam magnets (blue) follow a native Geant model
- Detectors count particles arriving on them
- Implementation is in github.com/adamjaro/lmon

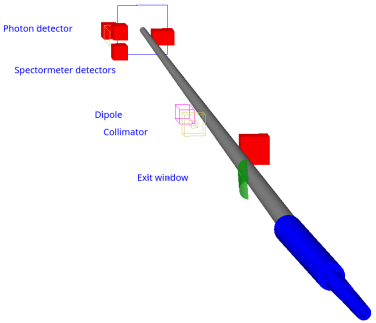

Figure: Geant layout

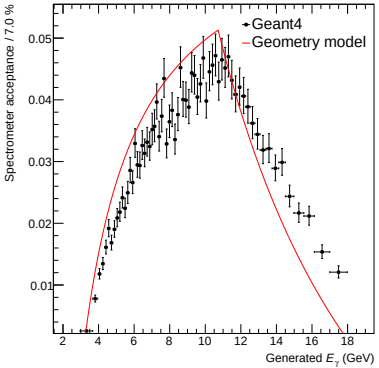

Figure: Spectrometer acceptance

Geant4 from YR, tagger side

- Details are in indico.bnl.gov/event/11852/contributions/49812/attachments/34806/56547/JA-Tagger_acceptance_20201027.pdf

- Two possible locations for taggers
- Solenoid field from BEaST parametrization and ECal
- Beam pipe is only a placeholder here

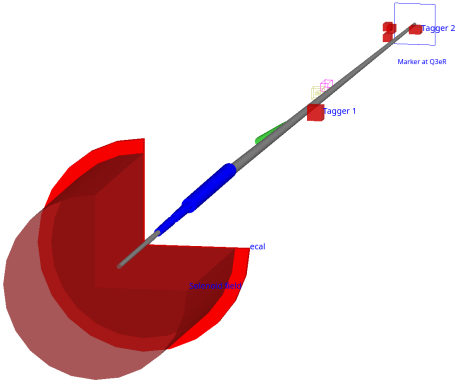

Figure: Geant layout

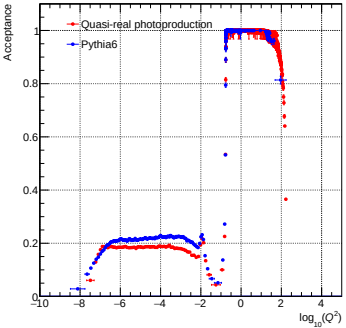

Figure: Combined acceptance with ECal

Even generator for bremsstrahlung photons and scattered electrons

- arxiv.org/abs/2105.10570, GETaLM: A Generator for Electron Tagger and Luminosity Monitor for electron - proton and ion collisions

- Photons and electrons in bremsstrahlung events
- Approximation for scattered electrons in DIS at low-Q^2
- Effect of electron beam divergence
- Uses PyROOT, implementation is in github.com/adamjaro/GETaLM
- Output is in a ROOT file

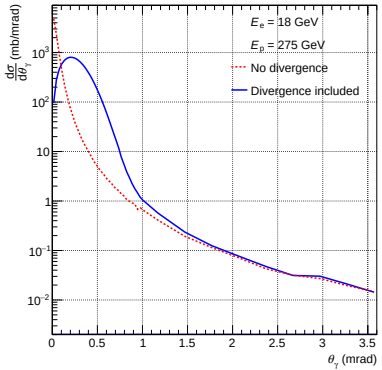

Figure: Bremsstrahlung cross section vs. photon angle

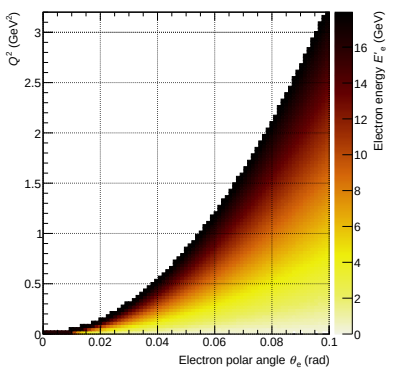

Figure: Electron Q^2, polar angle and energy