Photon Flux/Charge Studies

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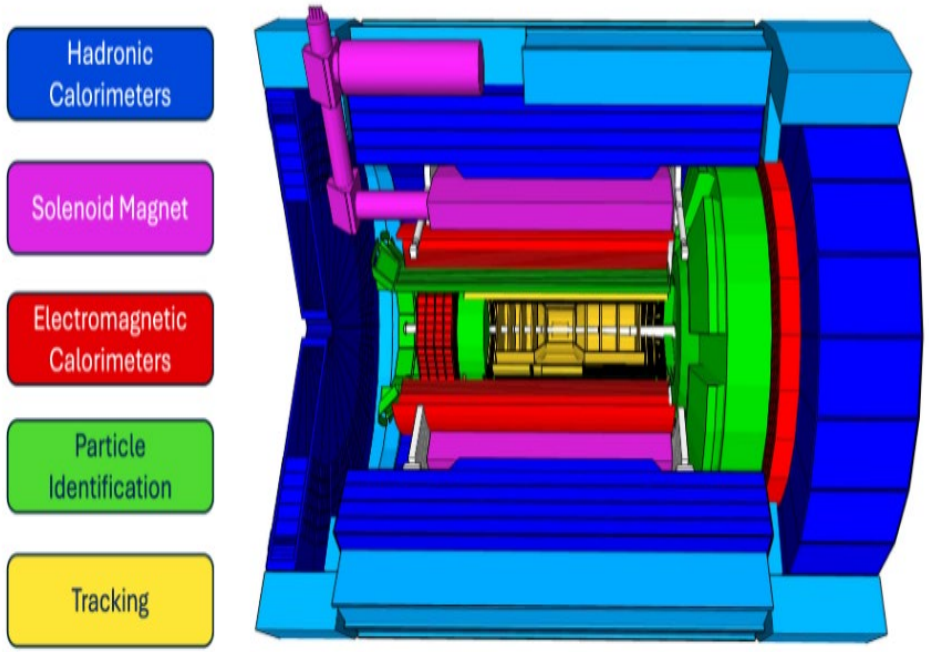
https://wiki.bnl.gov/EPIC/index.php?title=Electron_Beam_Gas

https://wiki.bnl.gov/EPIC/index.php?title=Hadron_Beam_Gas

Update

- Using irt-2.1b branch of EICrecon
- Have included pfrich+tracking geometry
- Now running on current eic-shell nightly version with up-to-date geometry
- Included wavelength-dependent quantum efficiency
- Will upload analysis script and readme with steps taken later this week

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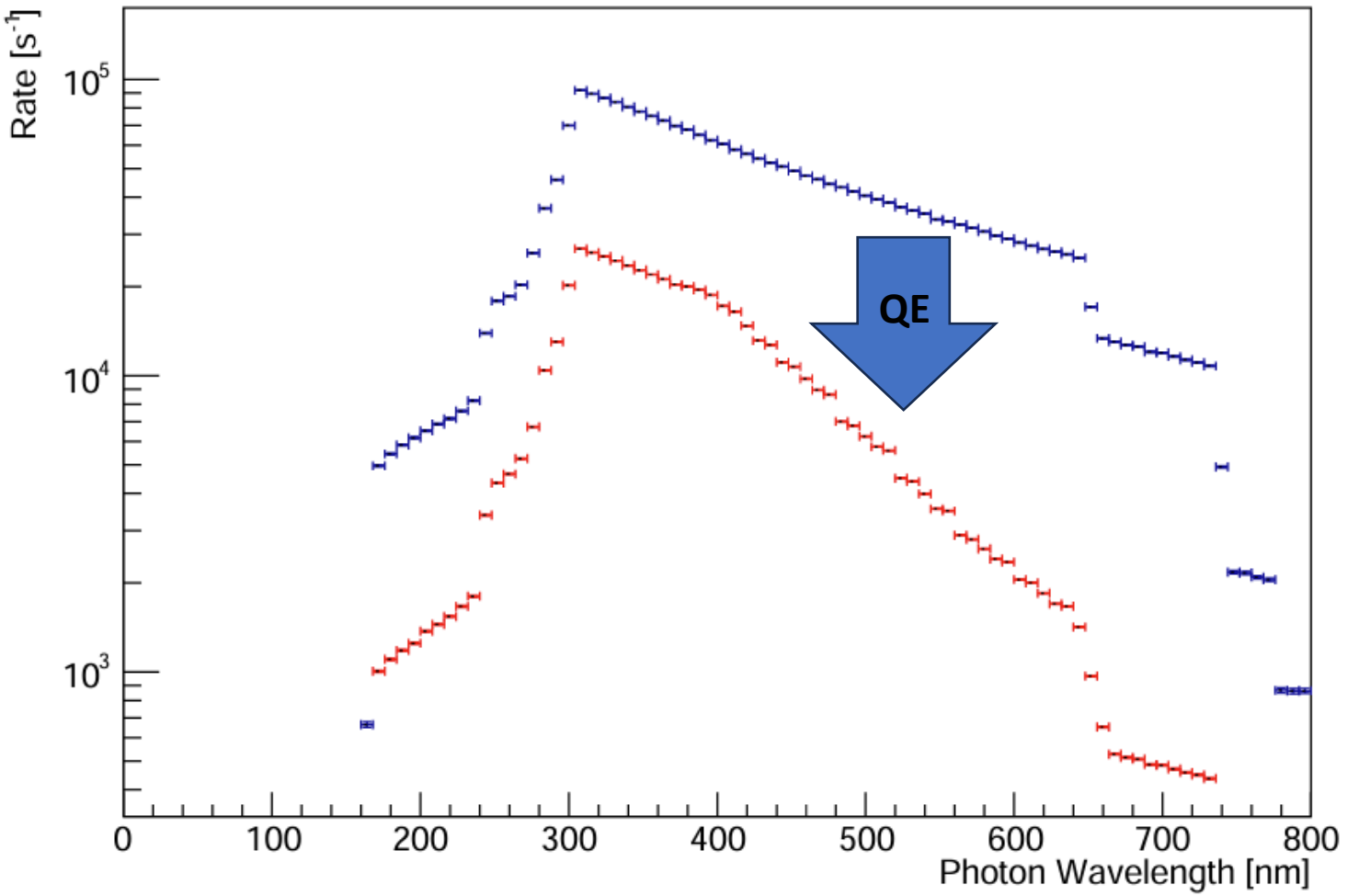
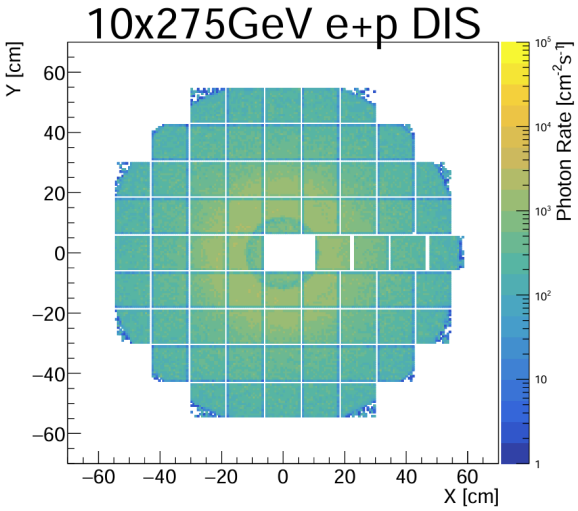
Wavelength

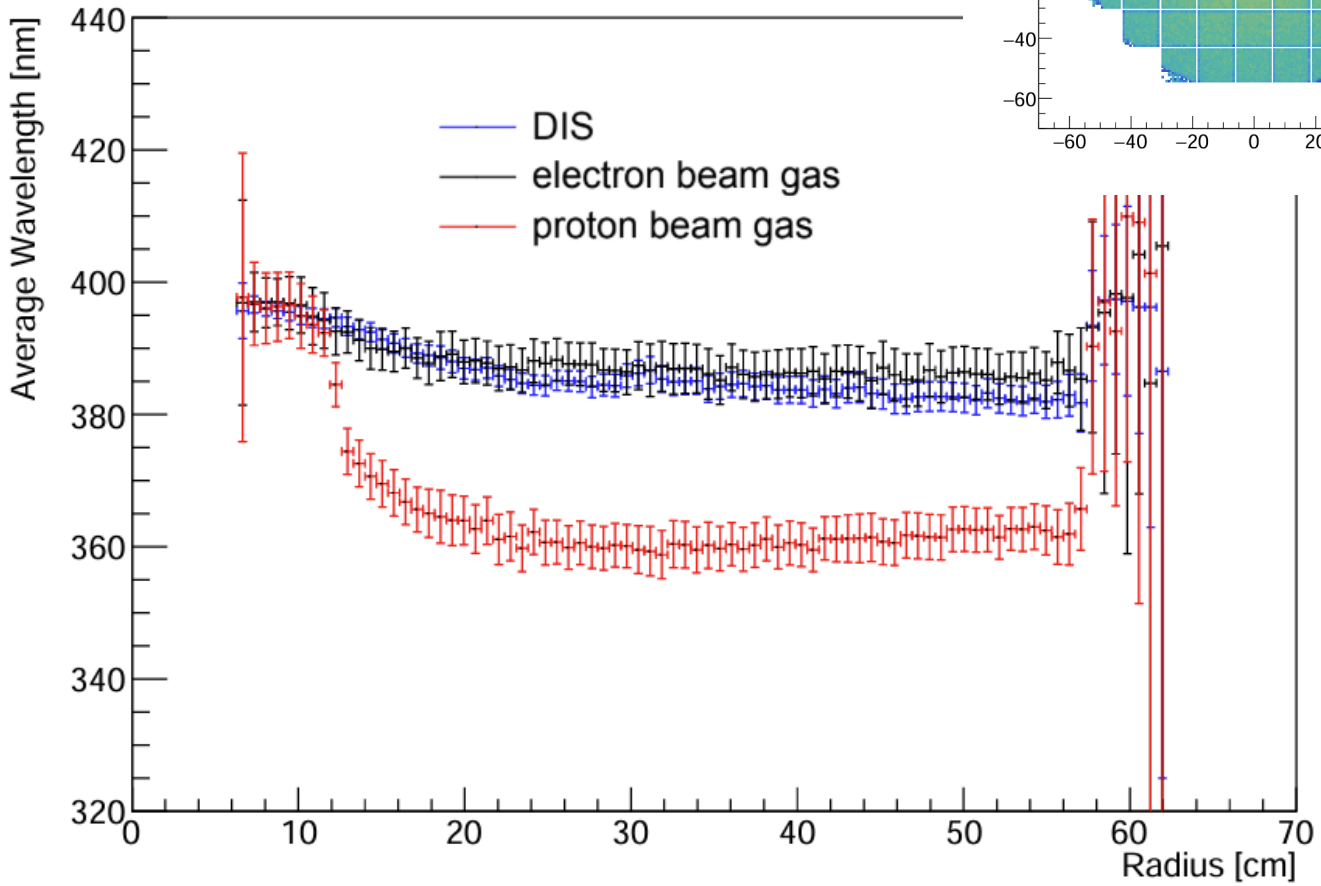
- DIS events: Before and after applying quantum efficiency



Wavelength from each background contributions

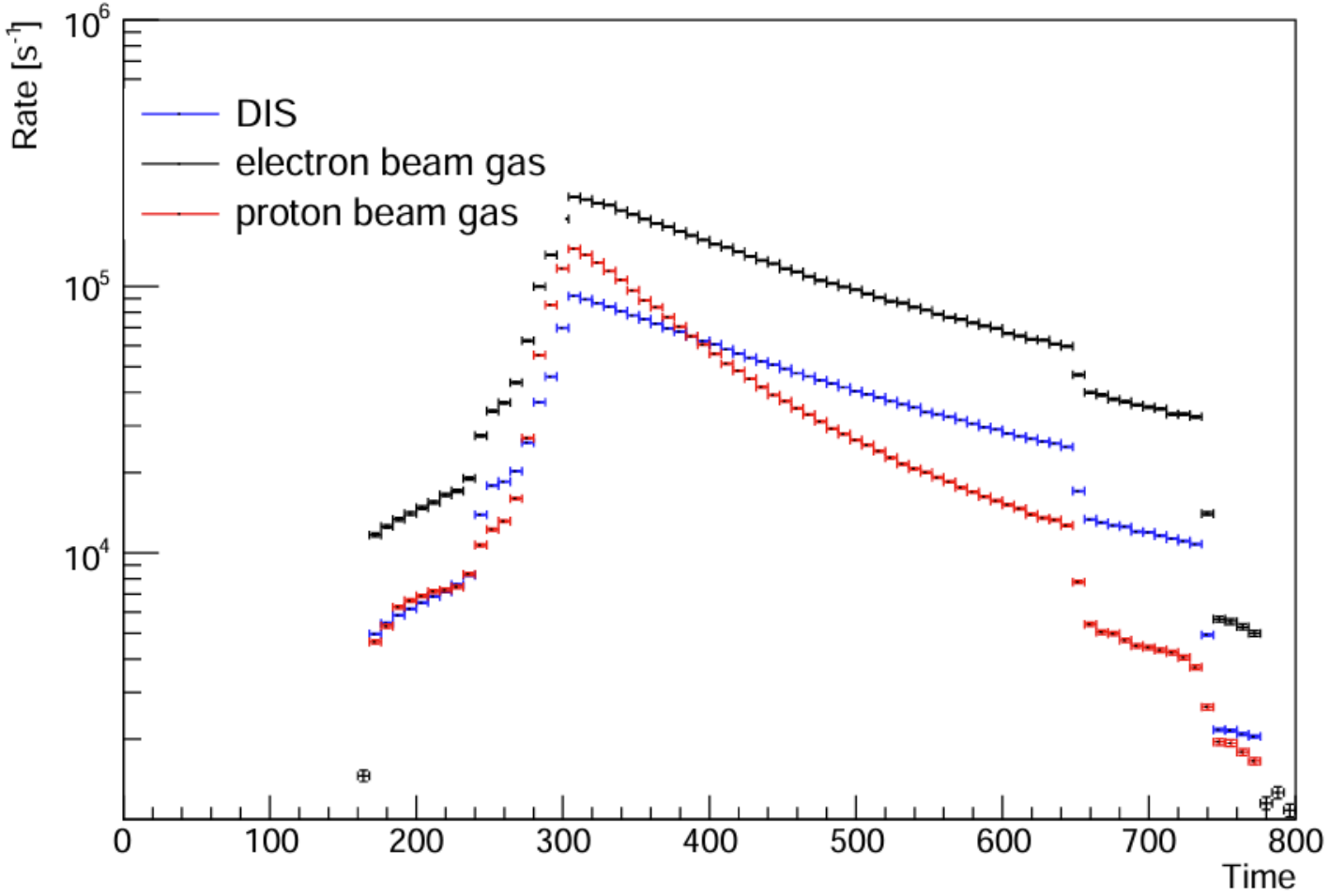
- Previously identified feature, Centered around beam pipe
- Wavelength dependence on R suggests that photons are being stopped





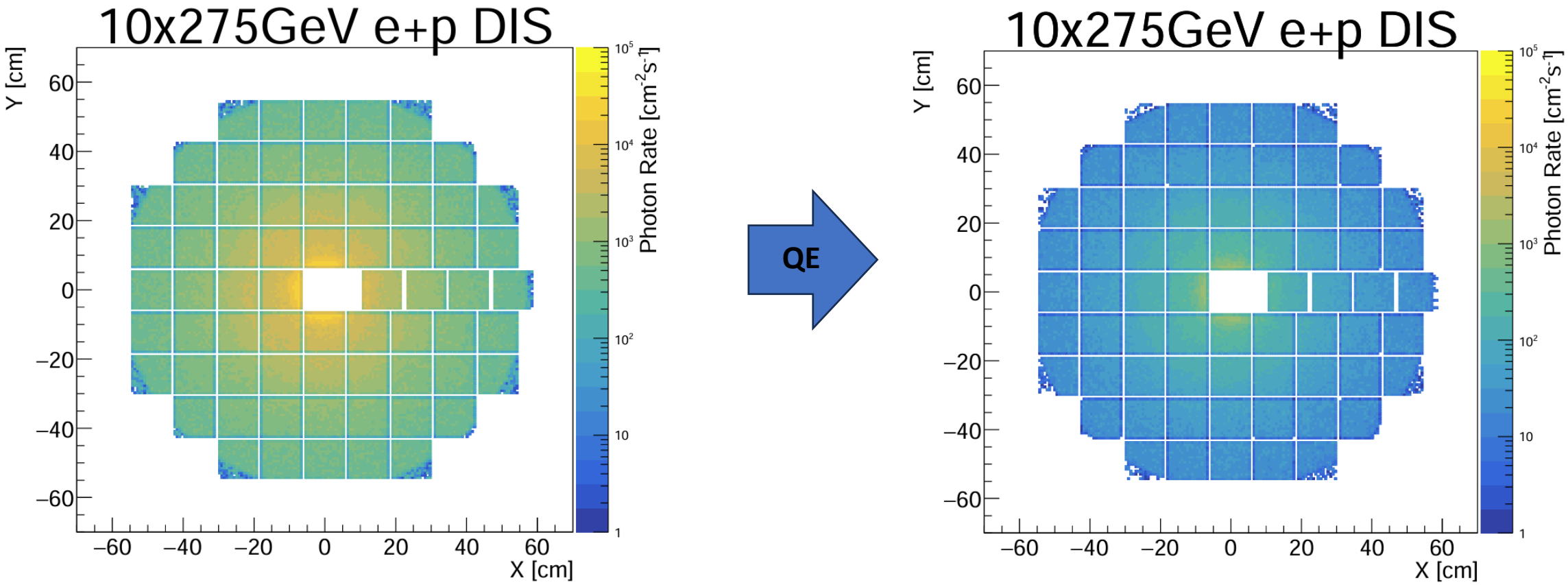
Different Wavelength Spectra

- Different wavelength spectrum due to proton+beam-gas interactions suggests much different charged particle spectra, or that there is a significant amount of photons not produced via Cherenkov
- Will compare with ideal Cherenkov case in future



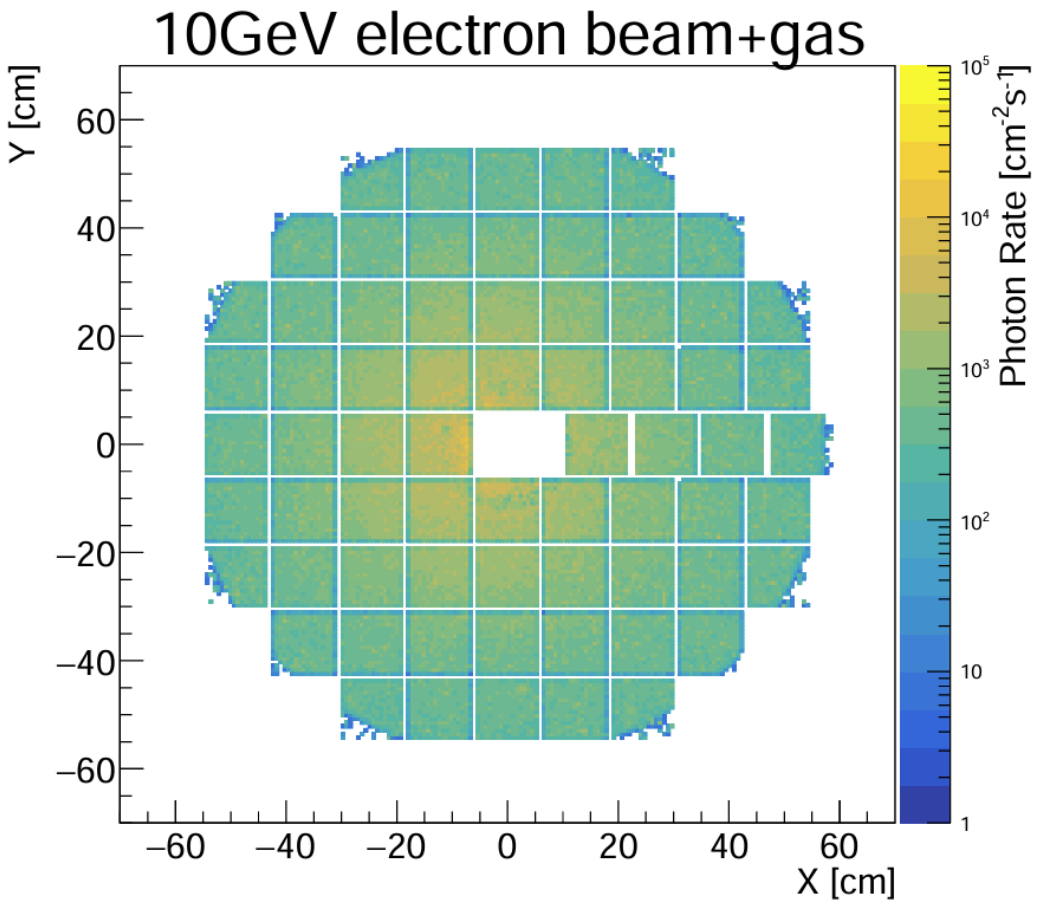
Flux Studies - DIS

- Determined from average of 15,000 events

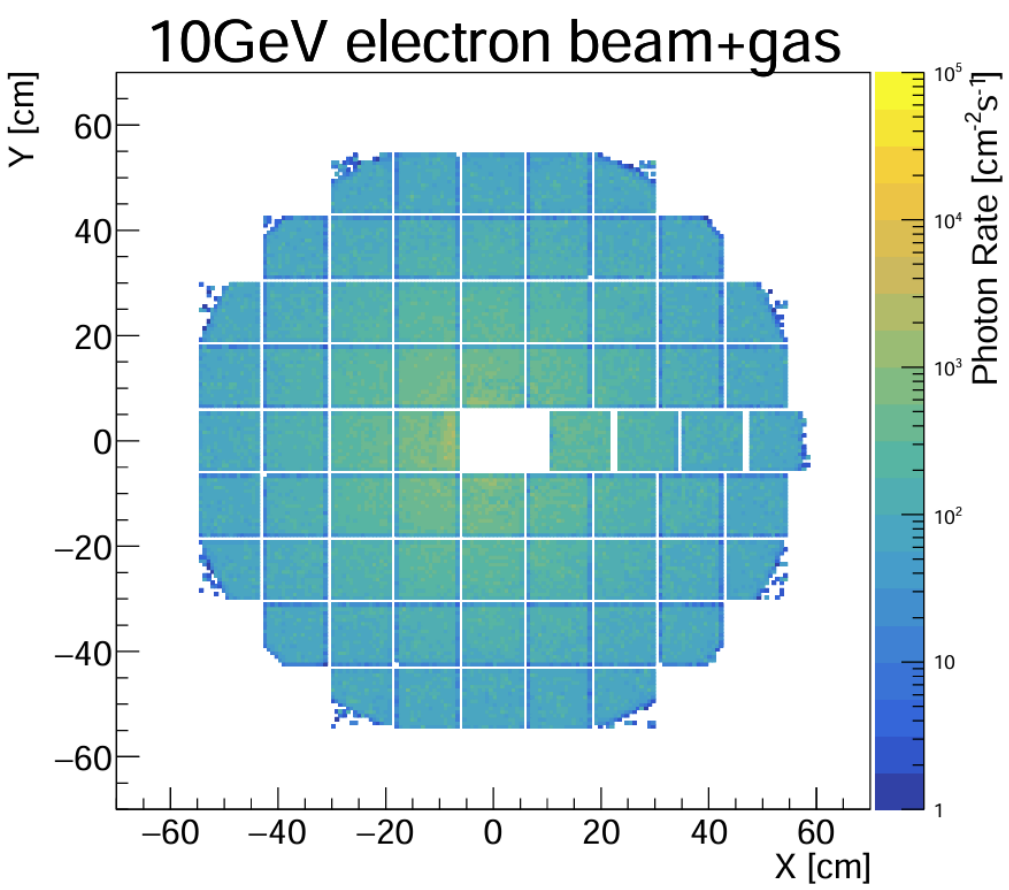


Flux Studies – Electron Beam Gas

Determined from average of 1,000,000 events

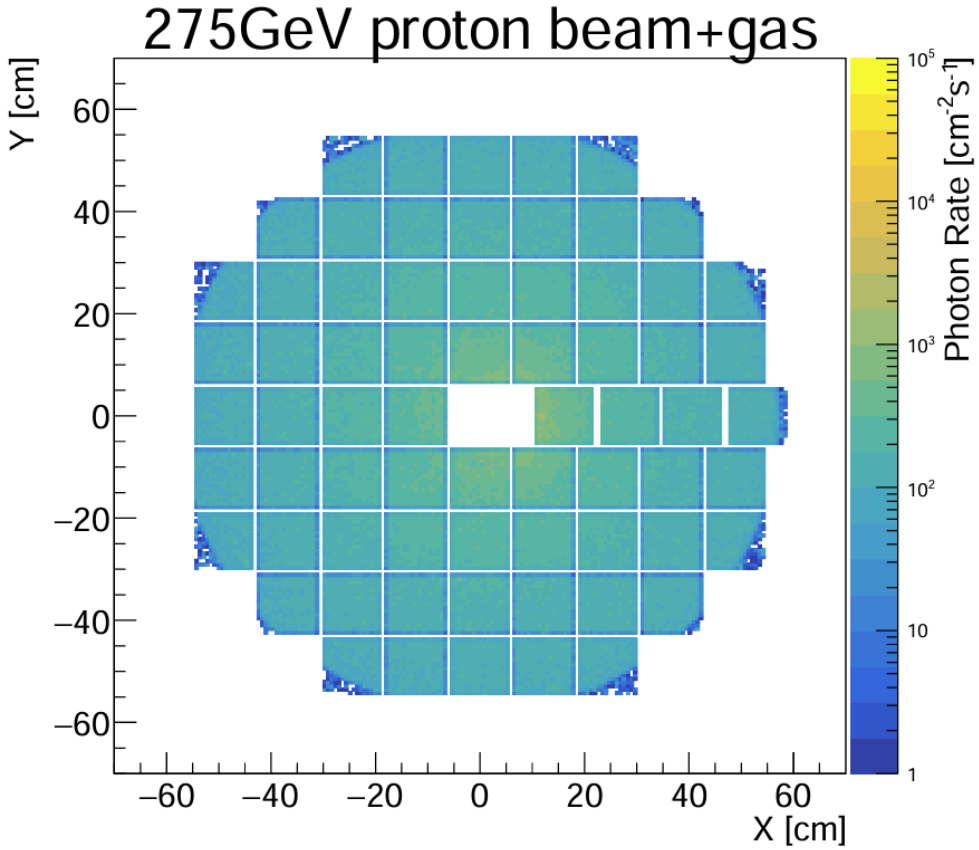


QE



Flux Studies – Proton Beam Gas

- Determined from average of 100,000 events



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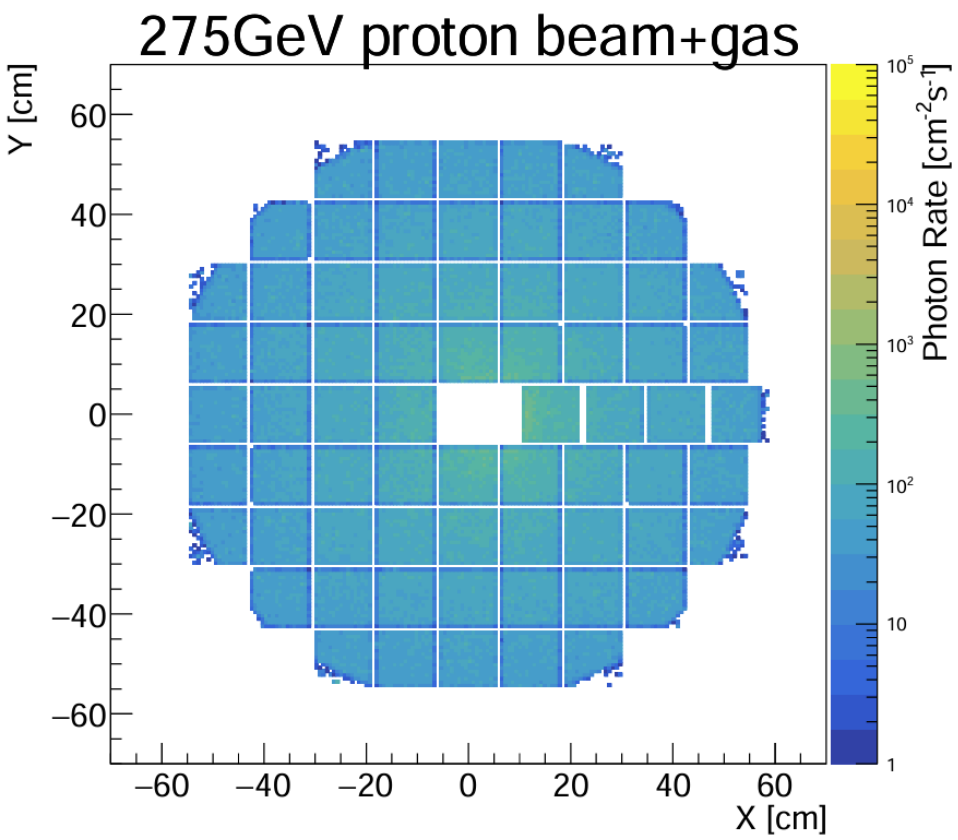
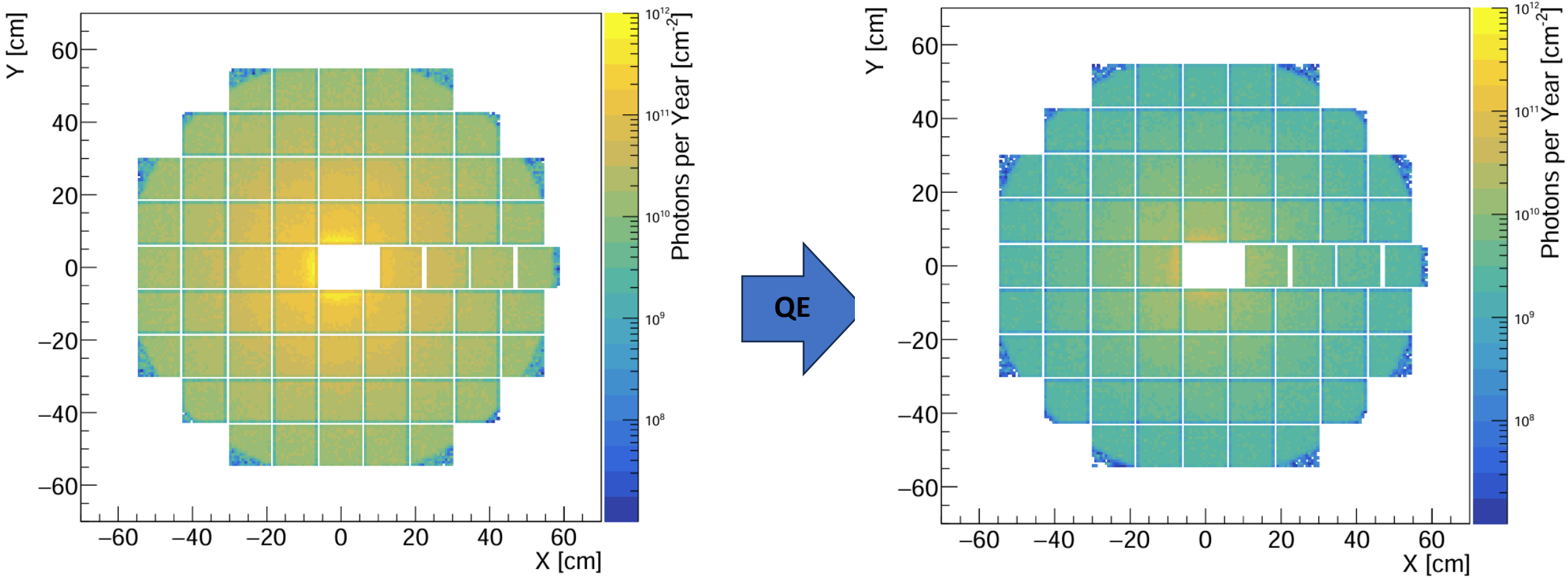


Total – One Year

New, smaller estimate of $10^{11} - 10^{12}$ Photons detected per year per square centimeter



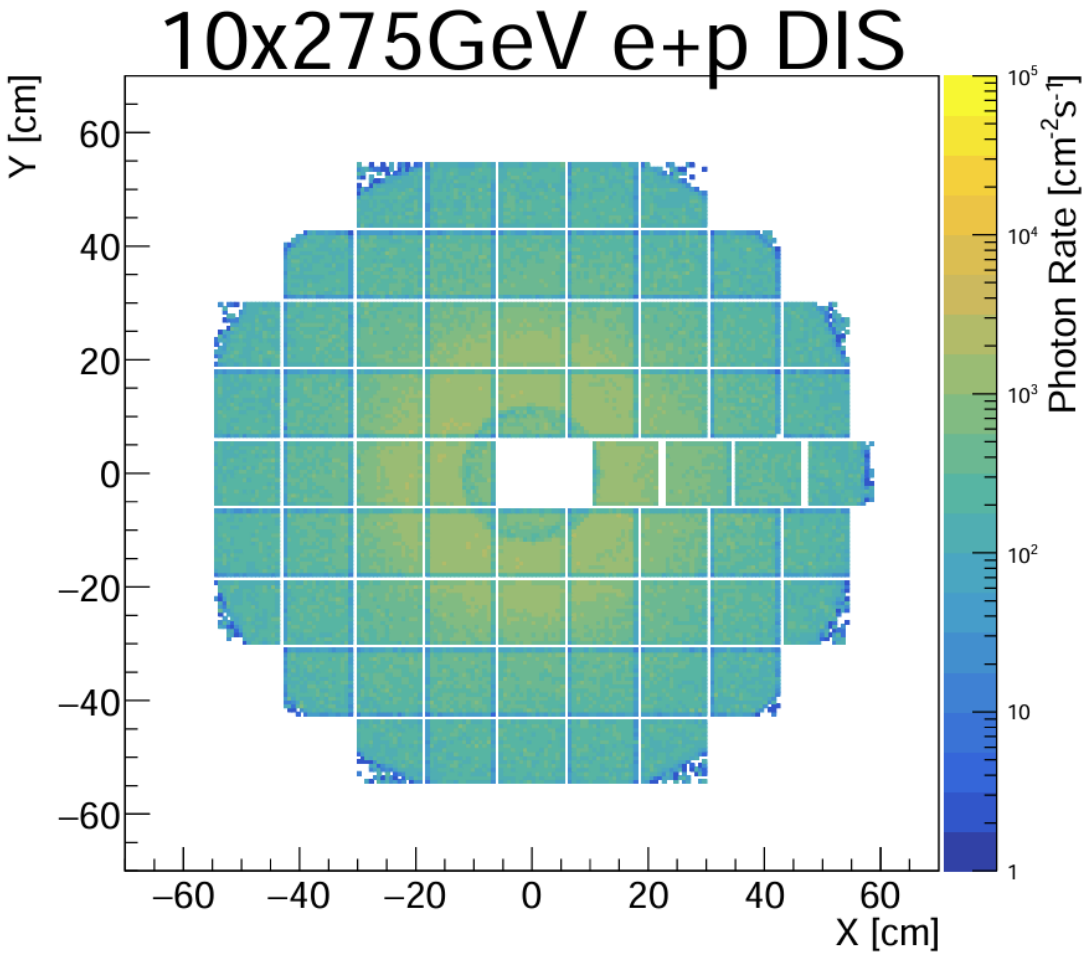
Updates to be done

- Studying change in beam energies
- Include full ePIC geometry
- Vary expectation for pressure in beam pipe
- Integrate across full DIS phase-space
  - Generating according to scheme presented here (https://wiki.bnl.gov/EPIC/index.php?title=Radiation_Doses#Radiation_Doses_and_Fluences_from_10x275_GeV_e+p_minimum-bias_events), selecting a maximum Q^2 of 1 GeV

Backup

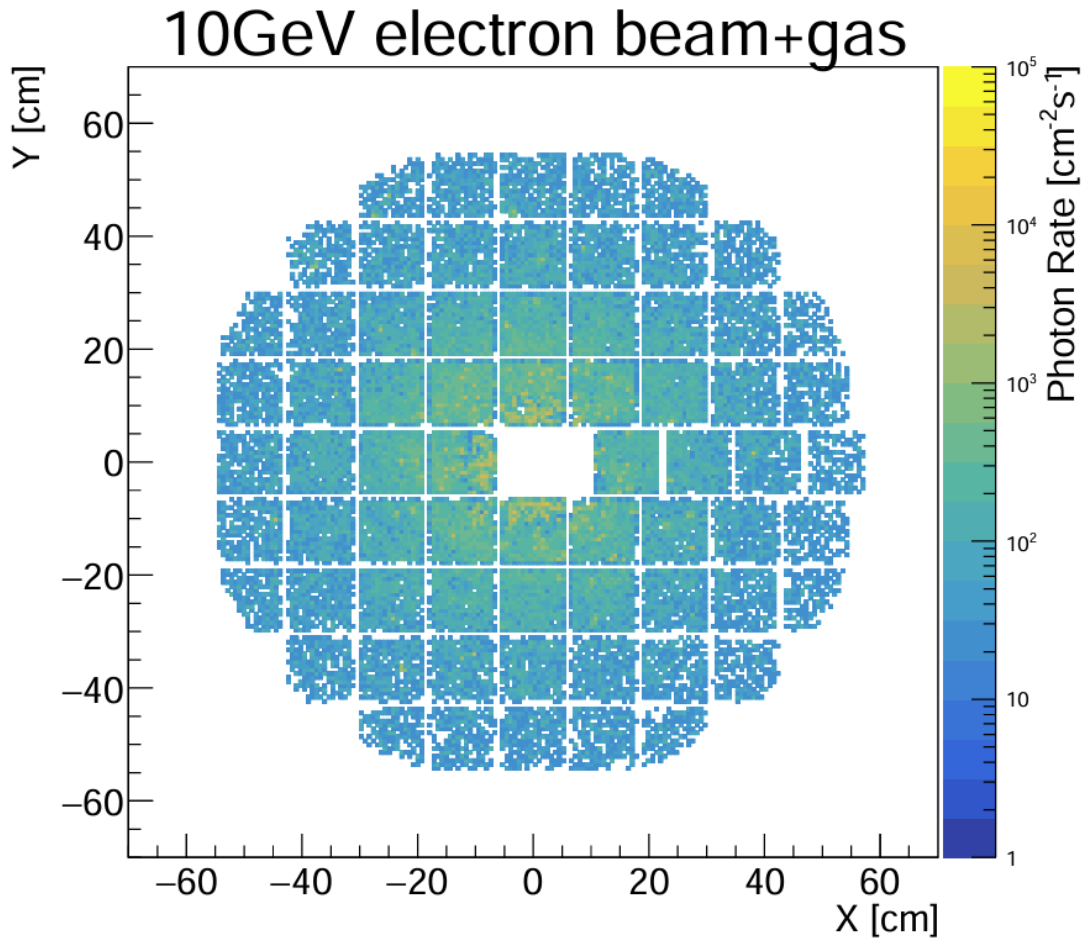
Wavelength

DIS – PfRICH only

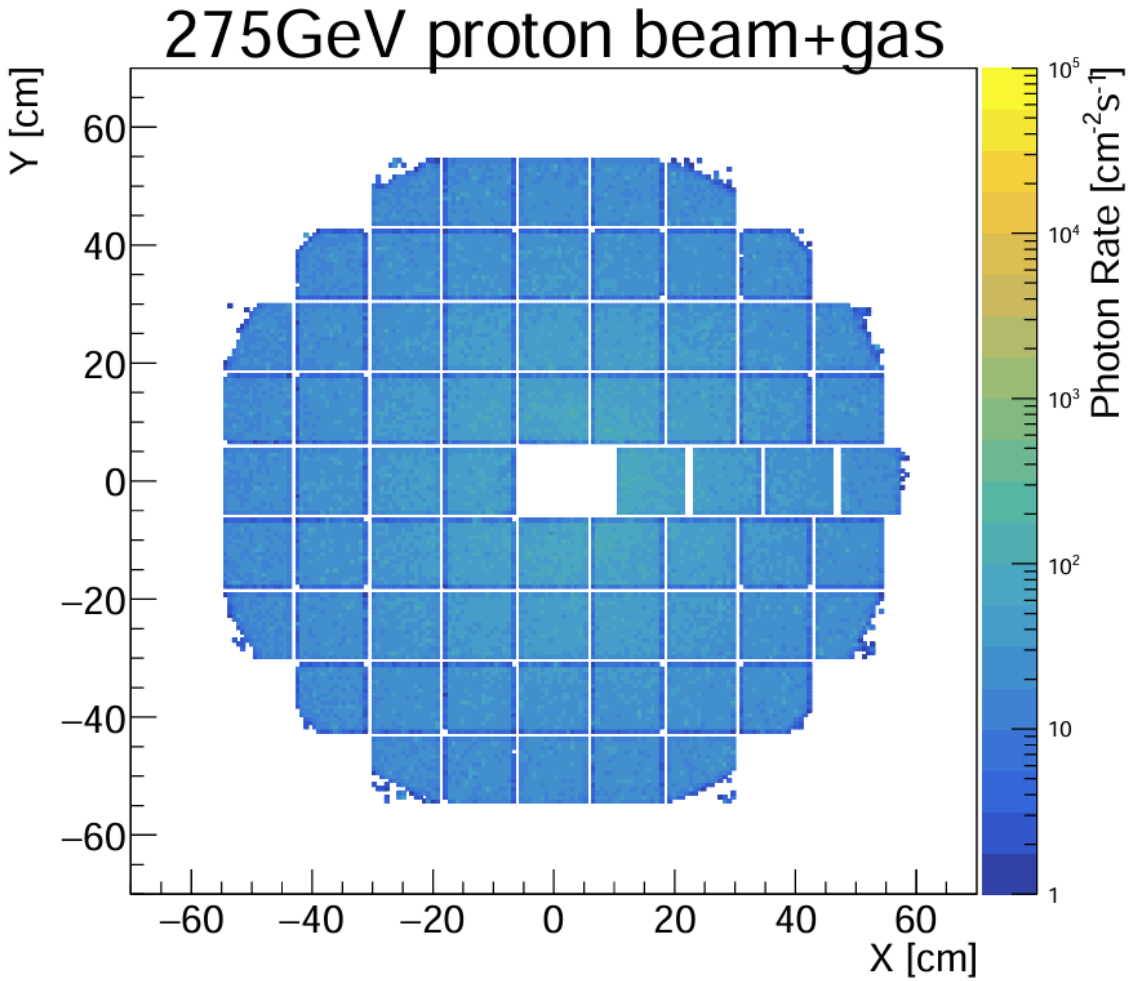


Electron beam-gas: pfRICH only

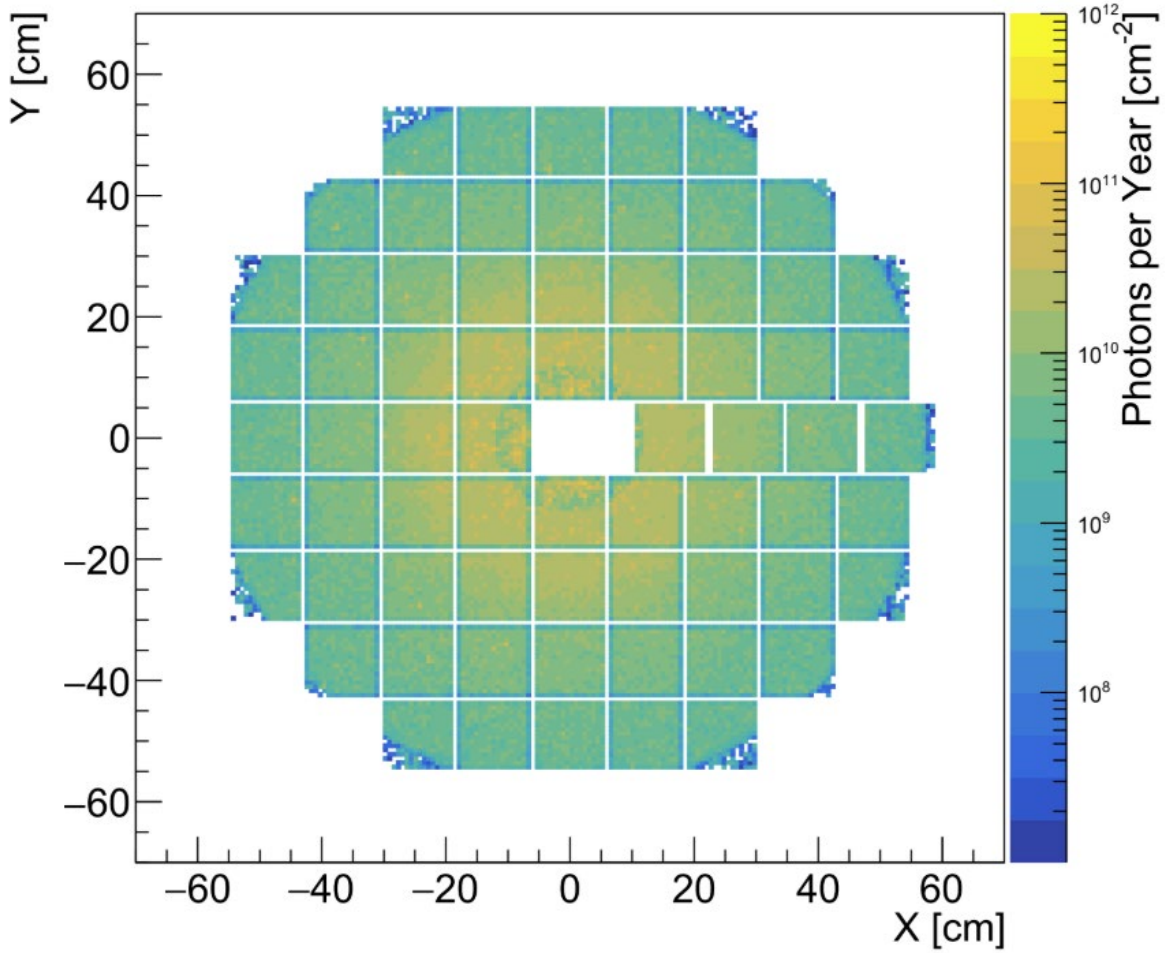
- Only 250,000 events



Proton beam-gas: pfRICH only



Total – One Year: pfRICH only



Wavelength Vs Radius 2D