



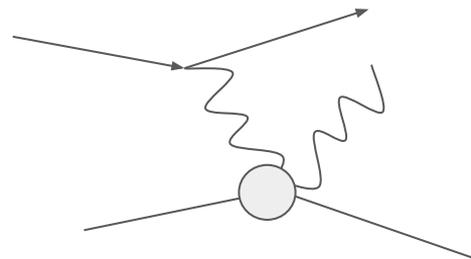
University  
of Glasgow

# DVCS eA Status

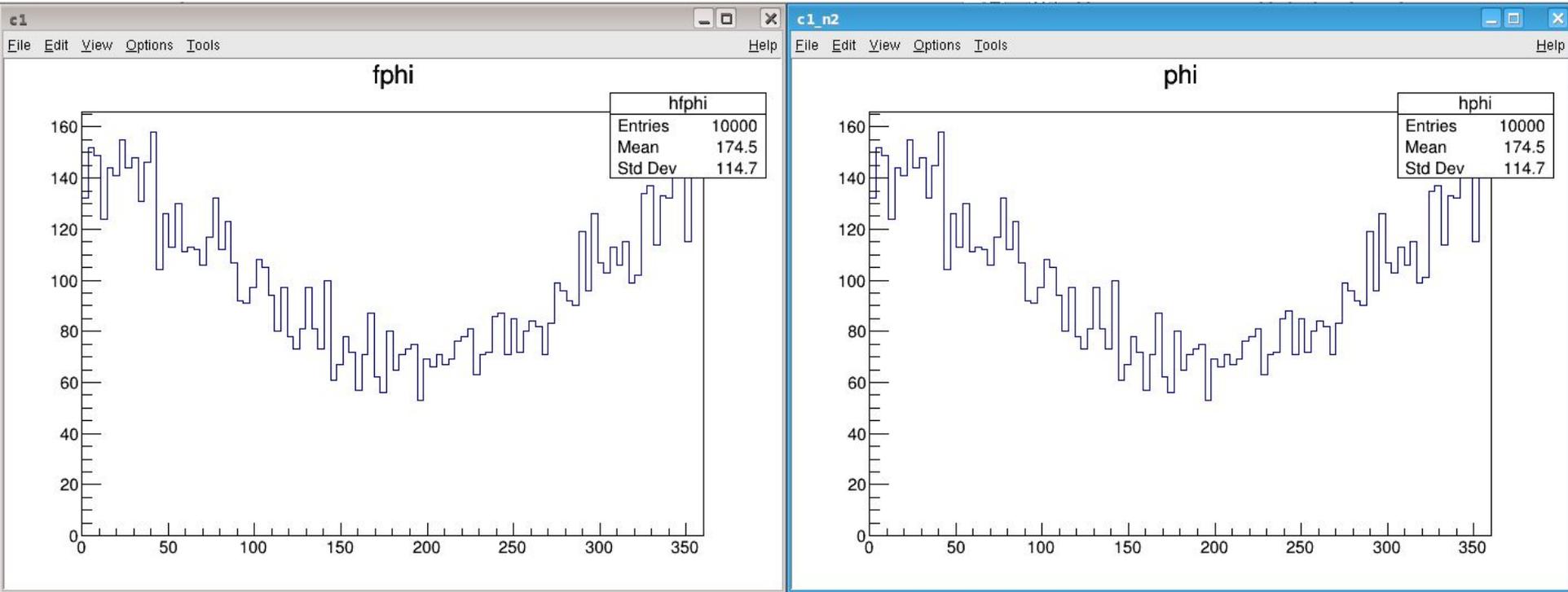
G. Penman, R. Montgomery

17/09/21

$eA \rightarrow e'A'\gamma$



# Phi Scattering Angle Reconstruction



Left: fphi calculated from lorentz vectors boosted to head frame

Right: phi directly from generator. Next to apply this to FFA Simulation output

FFA Calo Info: 18x110 Photon

nElectronTracks == 1

&&

Calorimeter photon with max energy per  
event "Pmax"

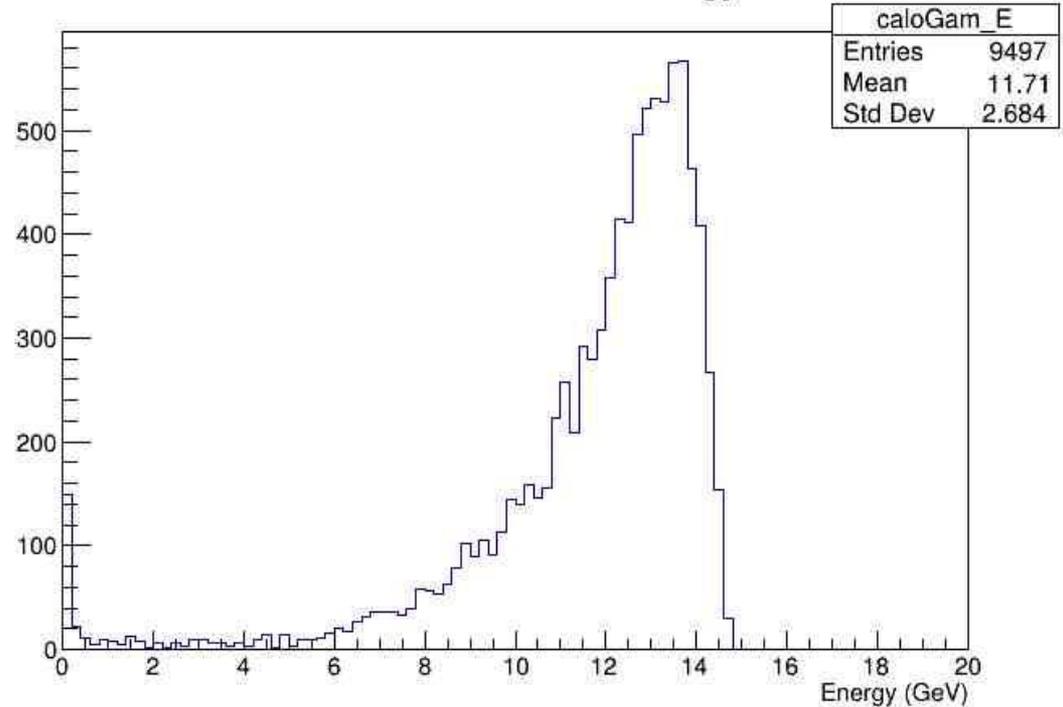
&&

Pmax > 100mev

Events 9755 -> 9497

Currently 99.99..% photon hits detected  
in EEMC or CEMC (need to separate out  
each calorimeter)

Calorimeter Photon Energy

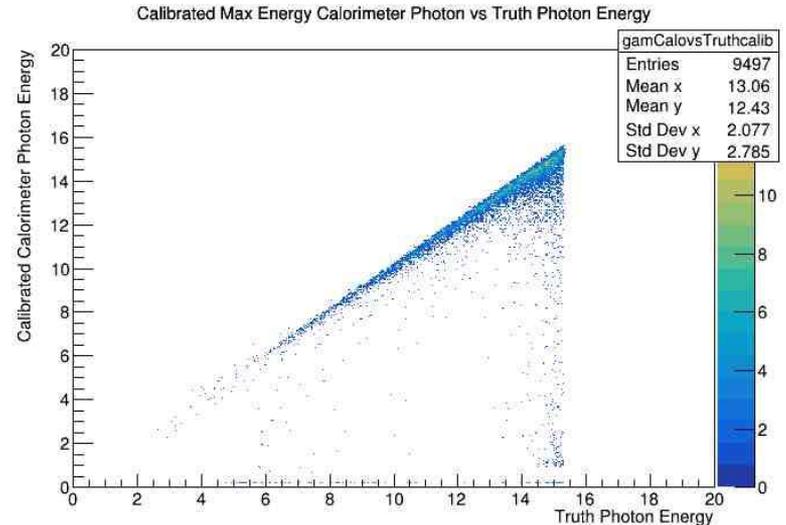
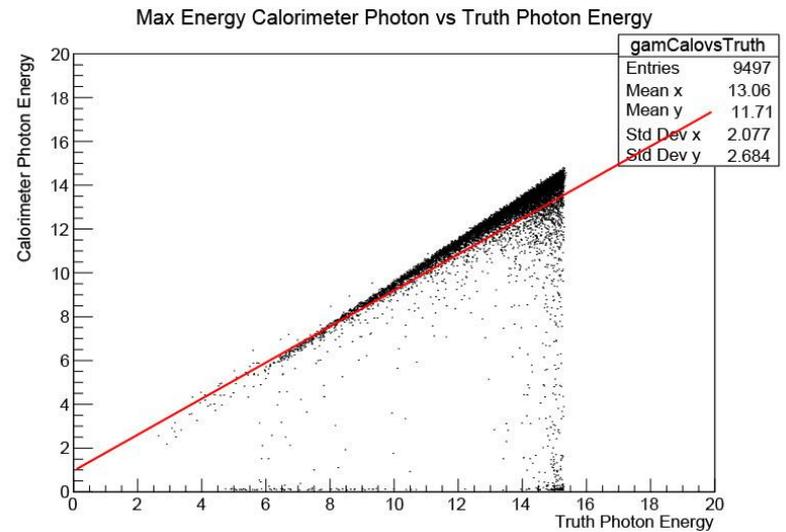


# FFA Calo Info: 18x110 Photon

Fit Pmax to Truth energy for calibration coefficients.

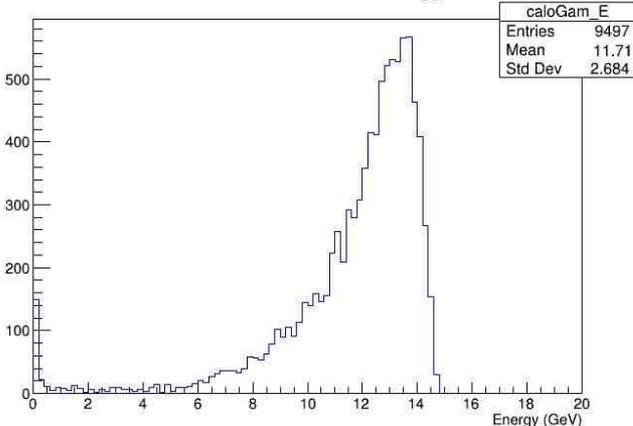
Currently have both FEMC CEMC EEMC photons combined but plan on separating into three separate fits (likely only two FEMC should be empty)

Calibrated photon energy mean increases +.72

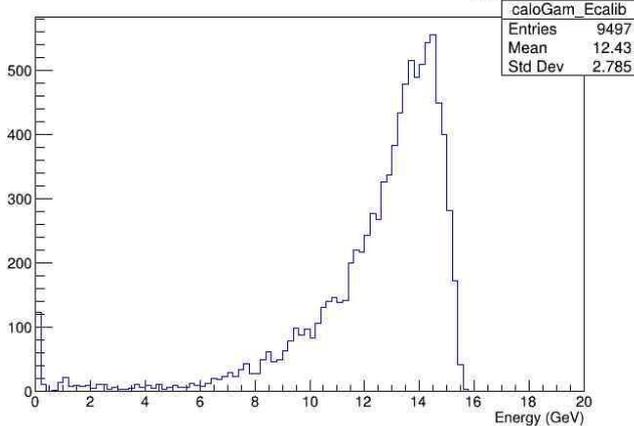


# FFA Calo Info: 18x110 Photon

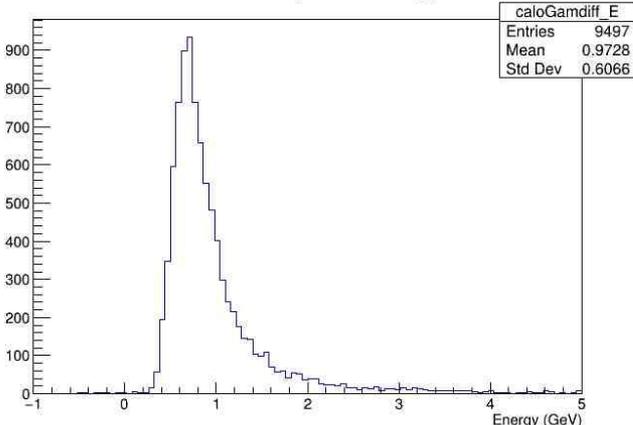
### Calorimeter Photon Energy



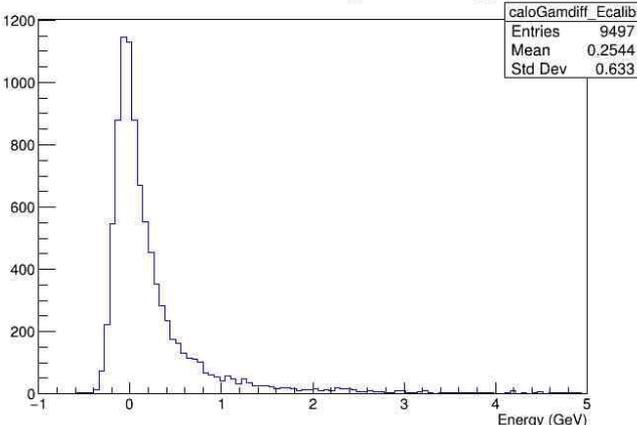
### Calibrated Calorimeter Photon Energy



### Truth - calo photon energy



### Truth - calibrated calo photon energy



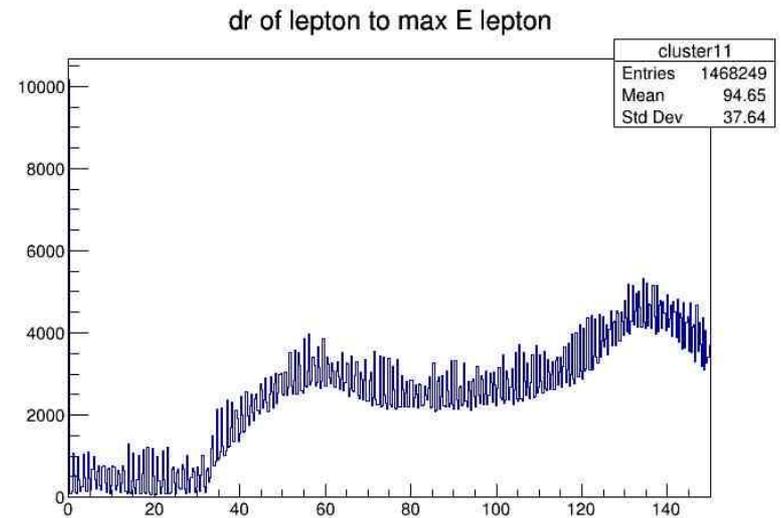
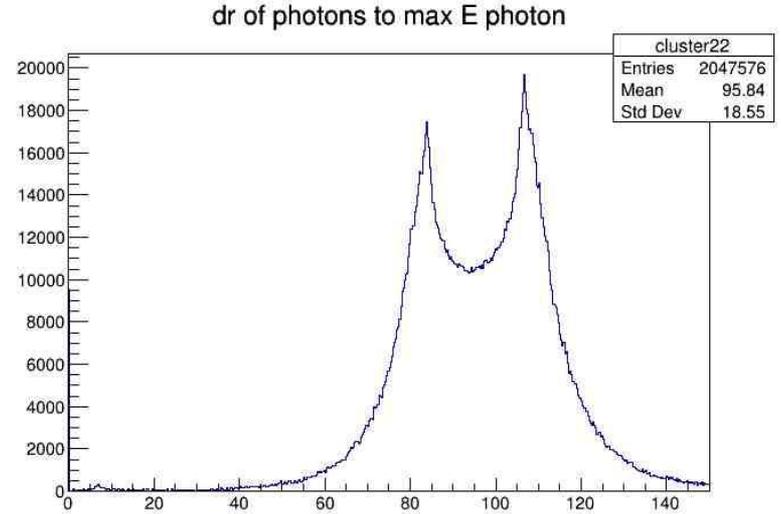
FFA Calo Info: 18x110 Photon

Take radial distance from every photon in clusters to Pmax photon

2 Peaks - calorimeter showers from DVCS photon and electron hits

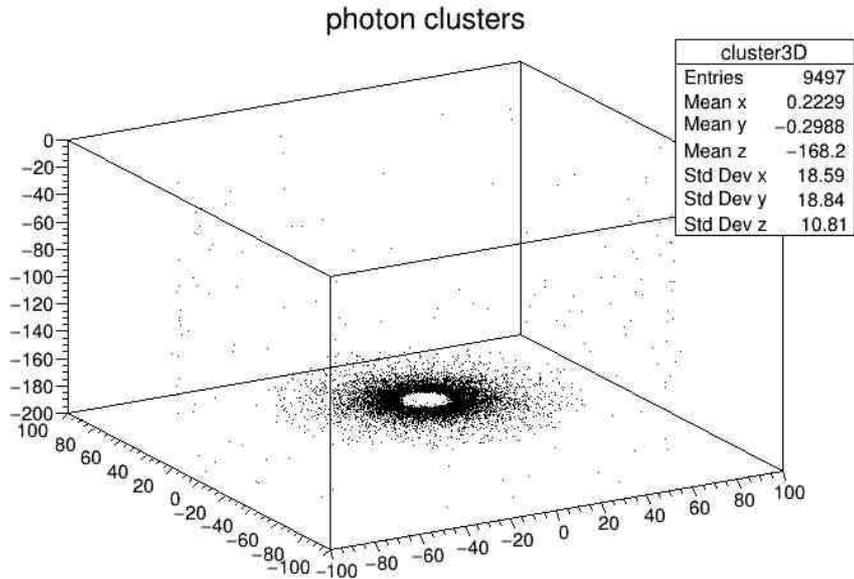
Radial distance from photons to max energy lepton shows 2 similarly separated peaks

Weaker in amplitude and more spread

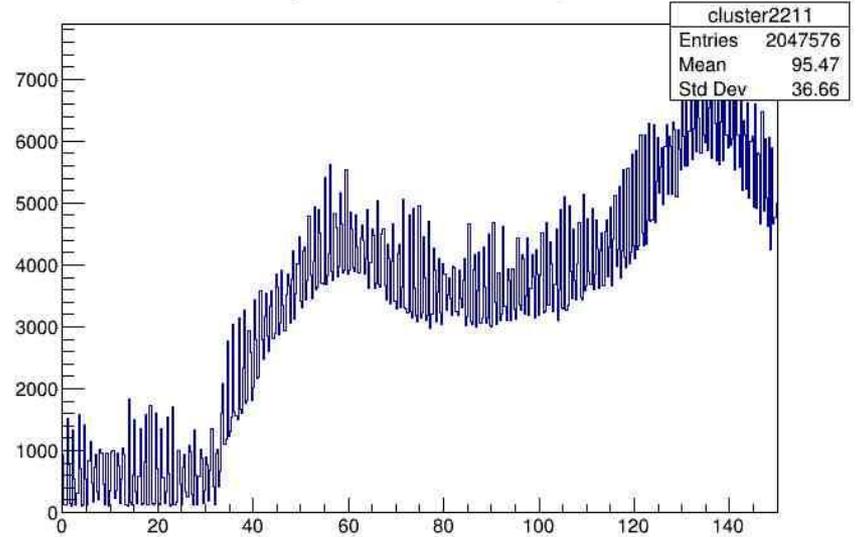


# FFA Calo Info: 18x110 Photon

Radial distance of photons in clusters to max lepton (which should correspond to track electron)



## dr of photons to max E lepton



3D Plot of Pmax Photon hits

Concentrated ring around central (z-axis beam dir)

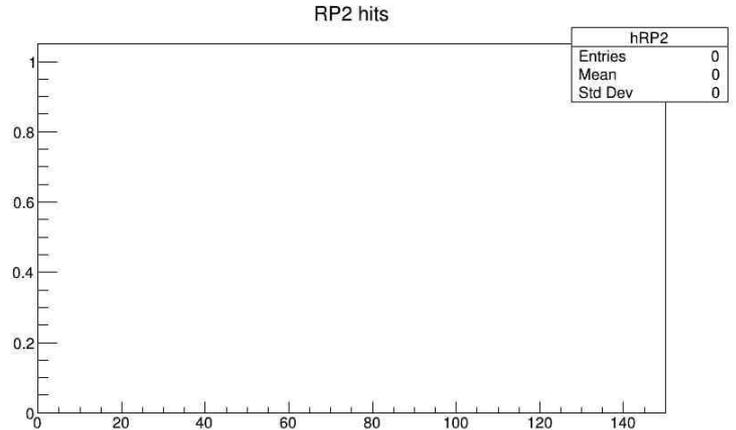
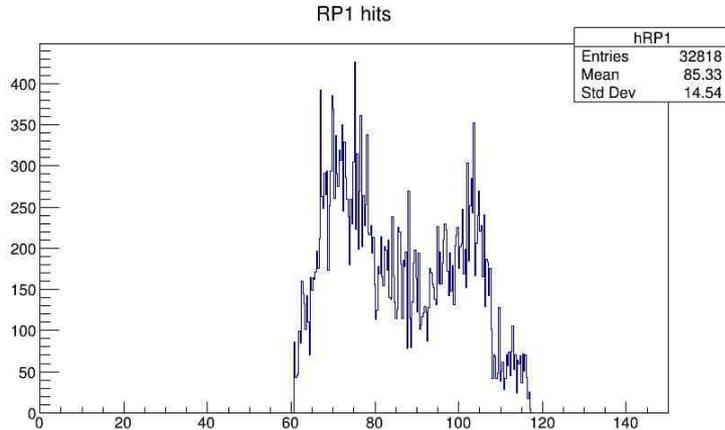
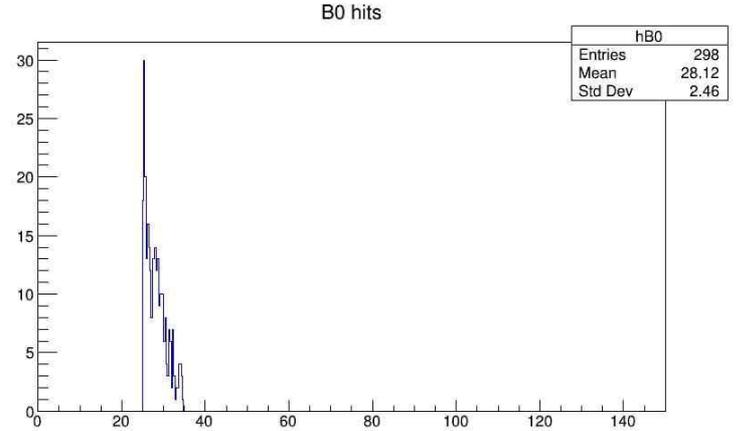
Confident that photon selection and acceptance is good

# FFA Track Info: 18x110 Helium (third cut using Roman Pot / B0 Silicon Detector info)

Working on 2.5cm cut on B0 for Helium ions

For 5x41 (main energy still simulating) expect many ions to end up in B0 detector same as Igor.

Need code discussed by Igor and Bill



# Plots Status

- DVCS Differential cross-section vs Momentum transfer  $t$ . Detector performance: low  $p_T$  acceptance in far-forward region.
- DVCS Differential cross-section vs Momentum transfer  $Q^2$ . Detector performance: low  $p_T$  acceptance in far-forward region.
- DVCS Differential cross-section vs Momentum transfer  $x_B$ . Detector performance: low  $p_T$  acceptance in far-forward region.
- Detector efficiency as a function of pseudo rapidity (different colors for different particles, vertical axis is %), detector performance and where the particle are detected
- $x_B$  versus  $Q^2$  filled with relative counts, detector acceptance,
- $t$  versus  $Q^2$  filled with relative counts, detector acceptance,
- $x_B$  versus  $t$  filled with relative counts, detector acceptance,

What do i need? Finish helium B0 / RP analysis to construct differential cross-section and have detector efficiency. Work for other 2 particles (90%) done.

Cross section normalisation.  $10 \text{ fb}^{-1}$  ?