International Workshop on Experimental and Theoretical Topics in CLAS Data Mining

Status on Analysis of omega Hadronization

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Outline

The goal of this analysis is to study the formation of the omega meson as part of the larger hadronization program at JLab. The analysis is entirely based on the existing eg2 data.

The goal of this talk is to highlight the use of the data mining software developed by the ODU group. I will emphasize its advantages and make suggestions for improvements.

Much of the work in this talk has been testing out the software and learning along the way. The analysis is in progress and the results are preliminary.

The eg2 Data

The omega meson production is much smaller than other mesons studied by the hadronization group. Thus, all of the data from the various eg2 run periods are needed.

Target	C	Fe	Pb	Sn
% Files Mined	95.2	11.5	24.2	100

% Files Mined = (# files in the data mining database)/(# runs in Lamiaa El Fassi's run list)

The mined files are from eg2c run period only. Files from eg2a or eg2b have not been filtered.

Results in this talk are from the carbon data only.

Analysis Schemes

For eg2, the data mining software has two analysis schemes available. Below they are labeled according to the bank names.

EVNT - incorporates the eg2 cuts and corrections during the filtering. Bank information is high level (four-vectors, vertices, etc.)
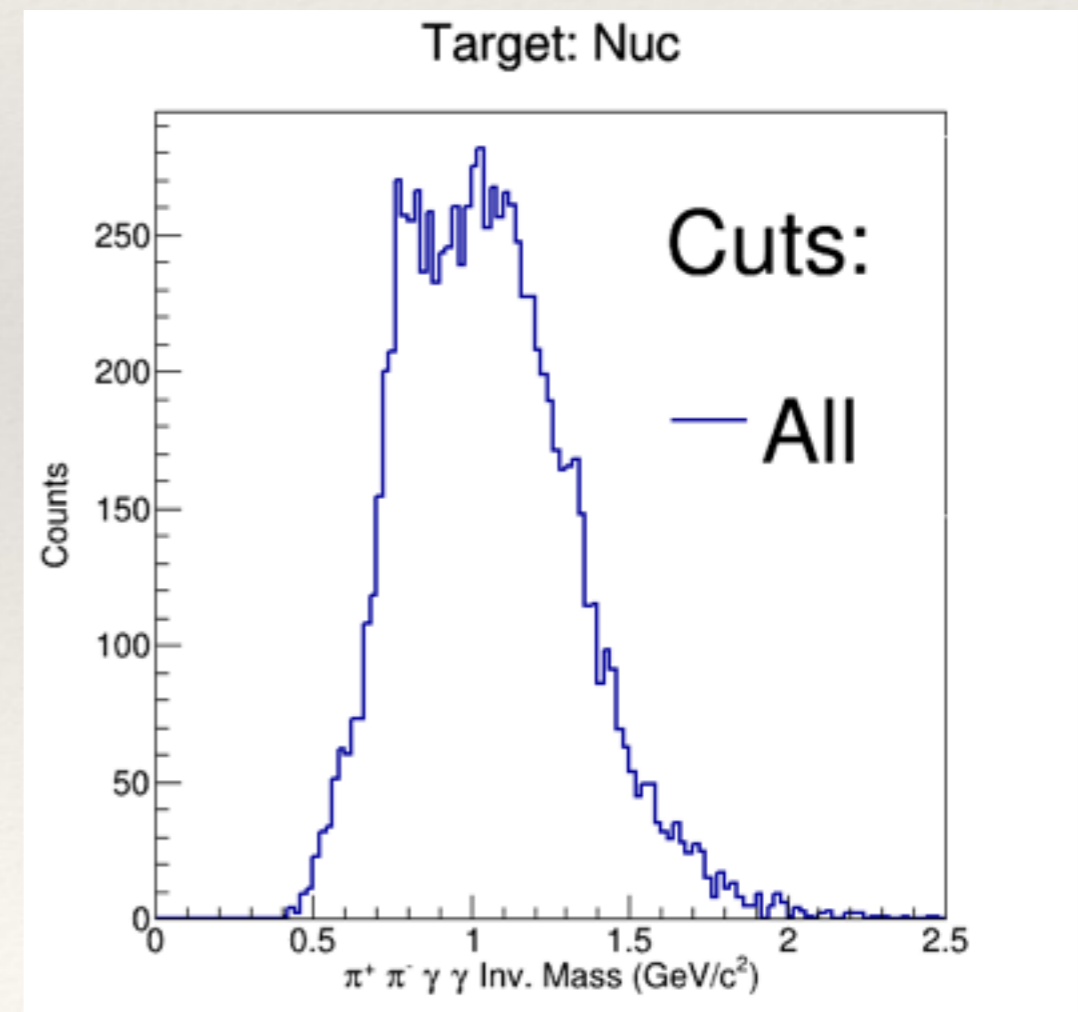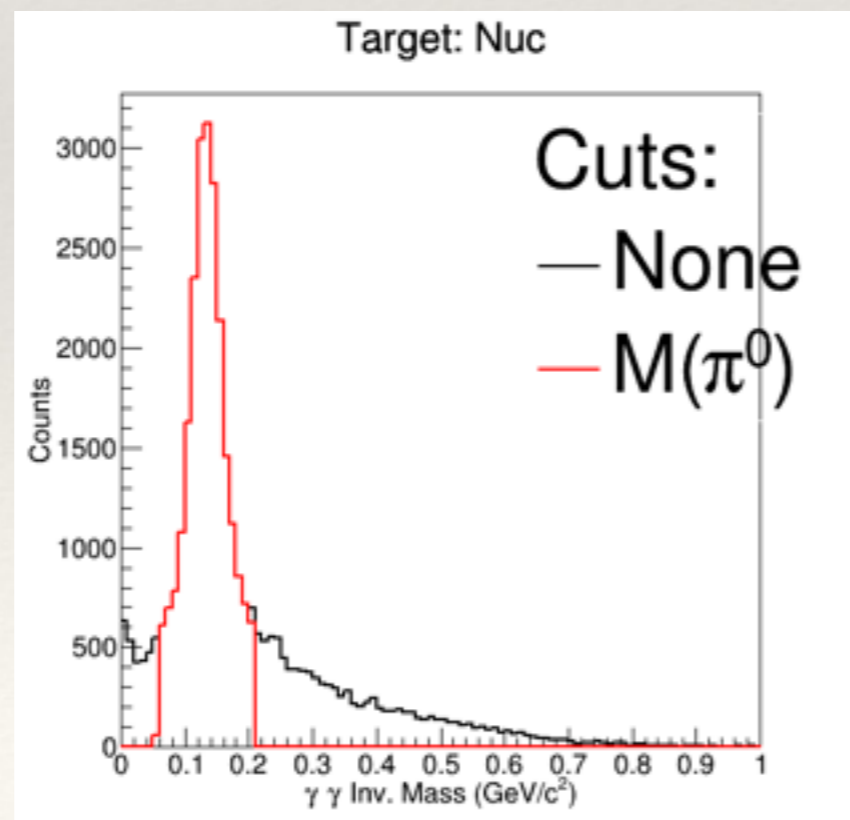
EXPB - no run specific cuts are applied. Provides detector information (EC, SC, CC) along with particle four-vectors.

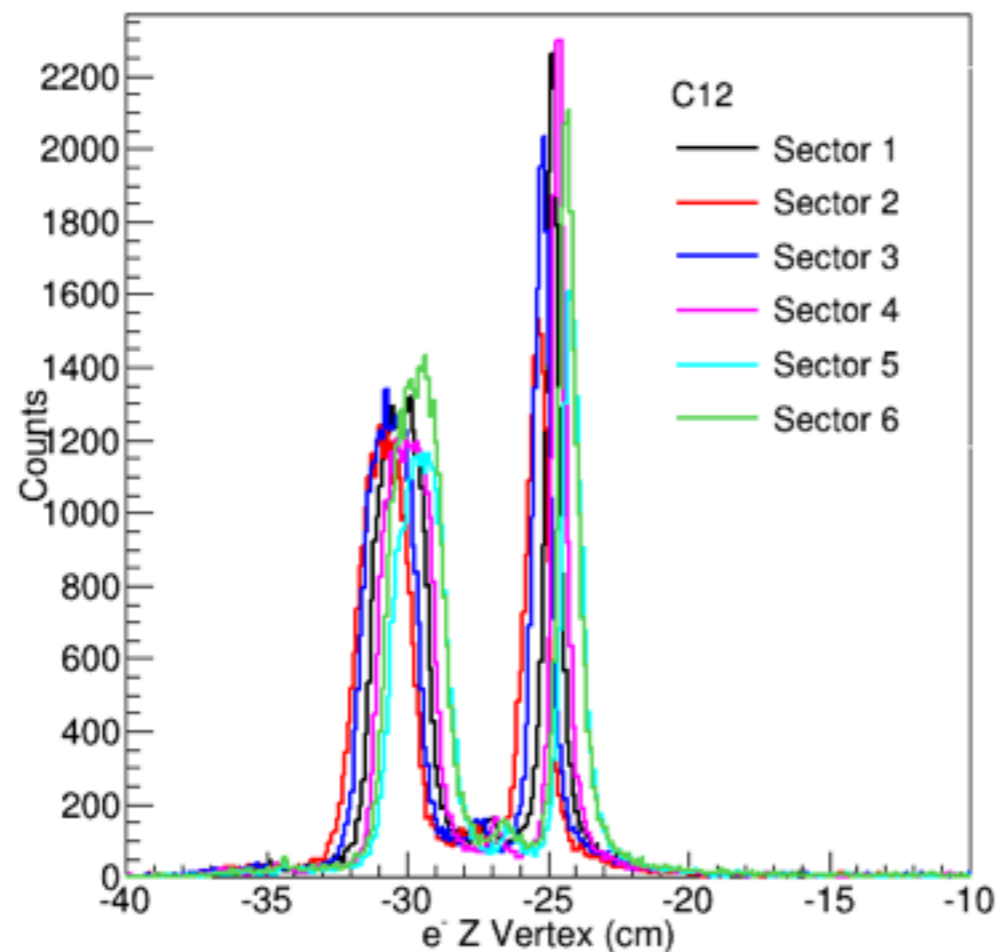# EVNT Analysis

Event selection: e-, pi+, pi-, 2 photons

Cuts:

- z-vertex matching between e- and other particles
- $Q^2 > 1\ GeV^2$
- $W > 2\ GeV$
- Angle between e- and each photon > 12°
- Reconstructed pi0 mass

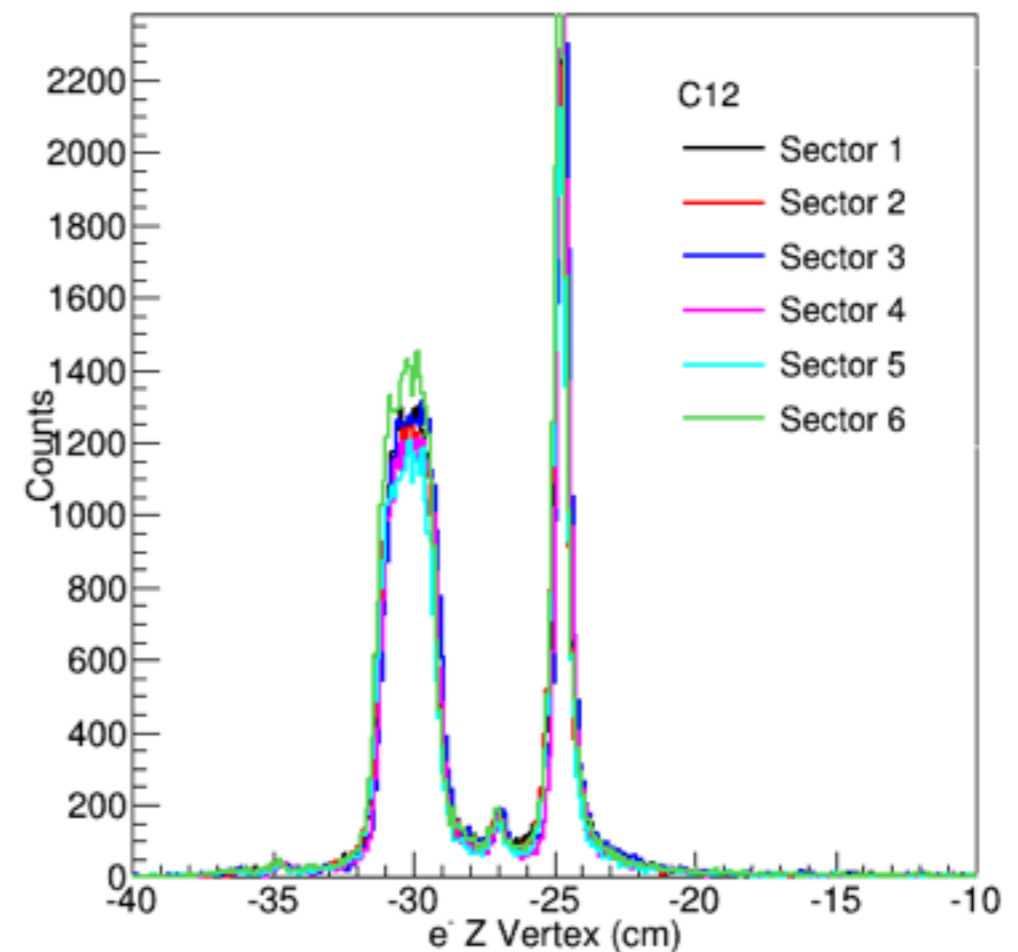# EXPB Analysis: Vertex Corrections

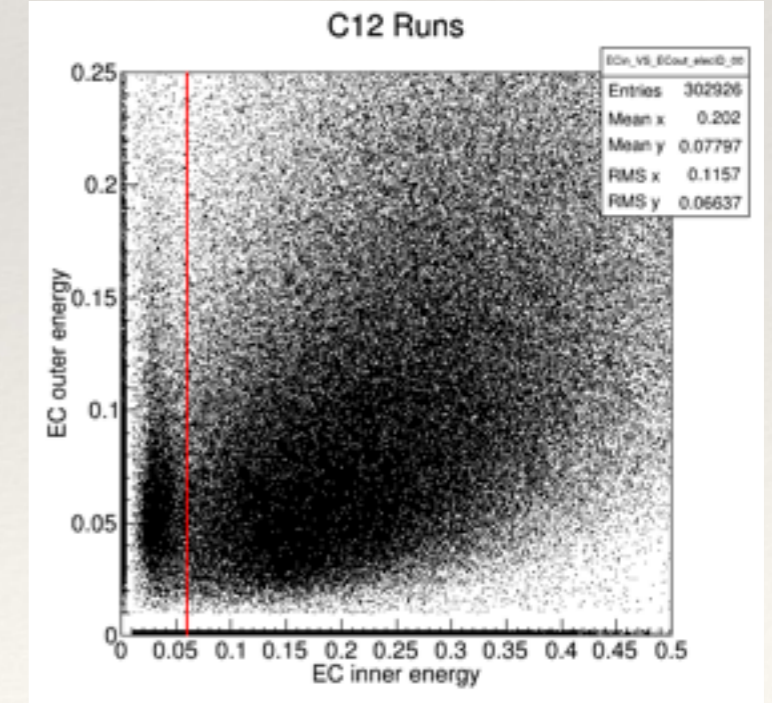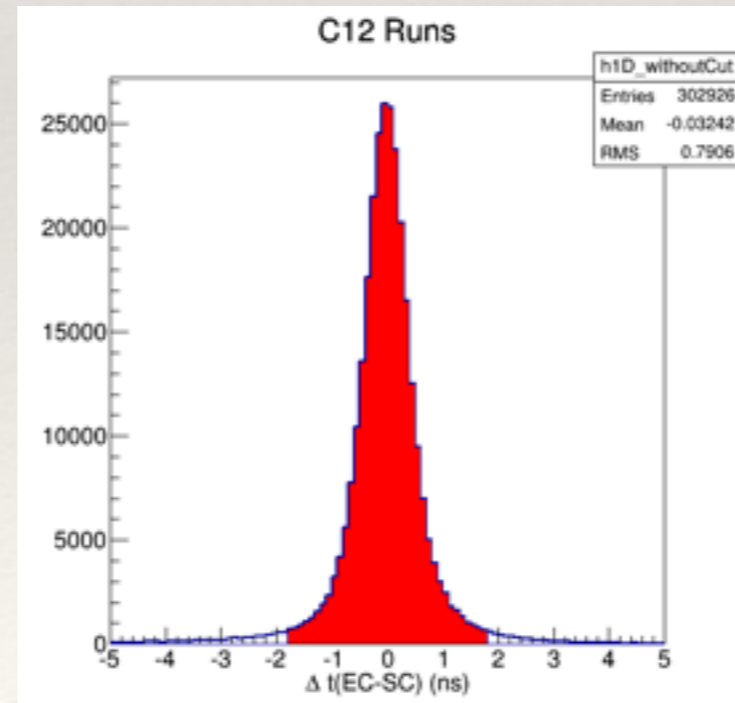Taya Mineeva's algorithm for correcting the target vertex was applied inside the analysis code.
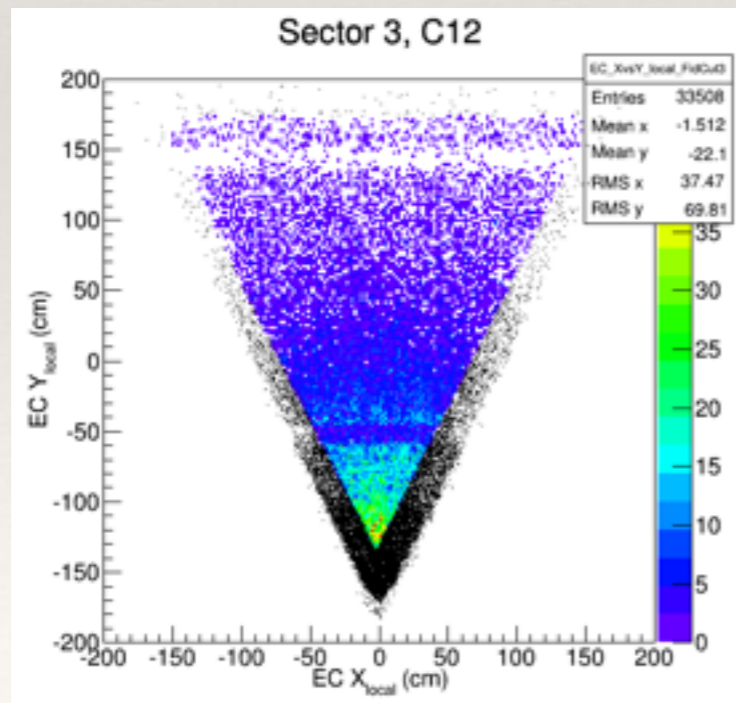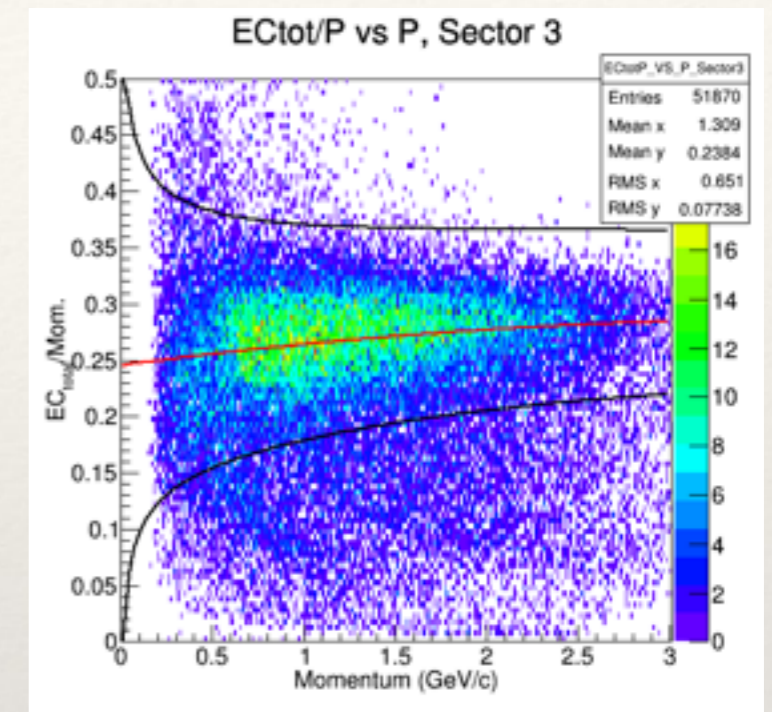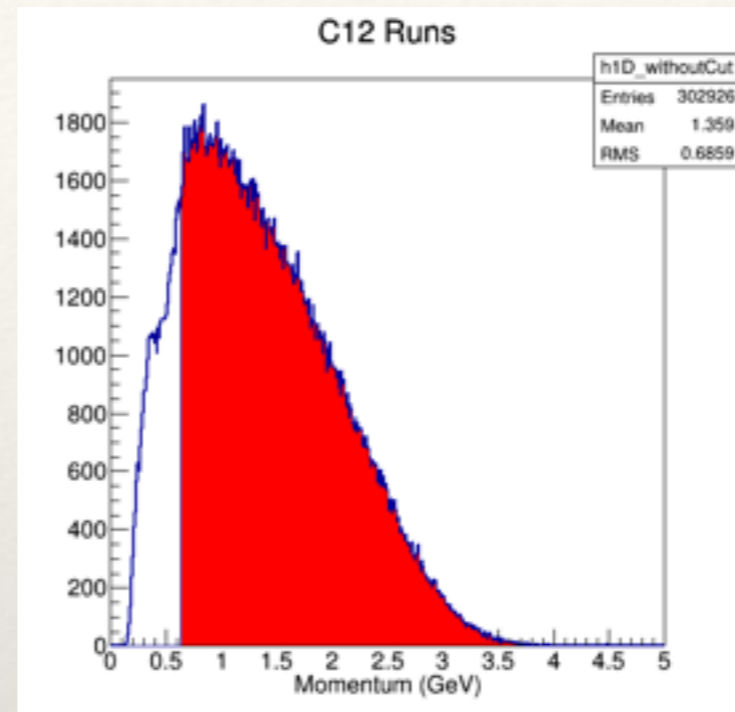
EXPB Analysis: electron ID

Cuts applied to identify the electron

- EC_{total} energy vs momentum
- EC_{inner} energy
- EC fiducial region
- Time difference between EC and SC, adjusted for EC and SC path lengths
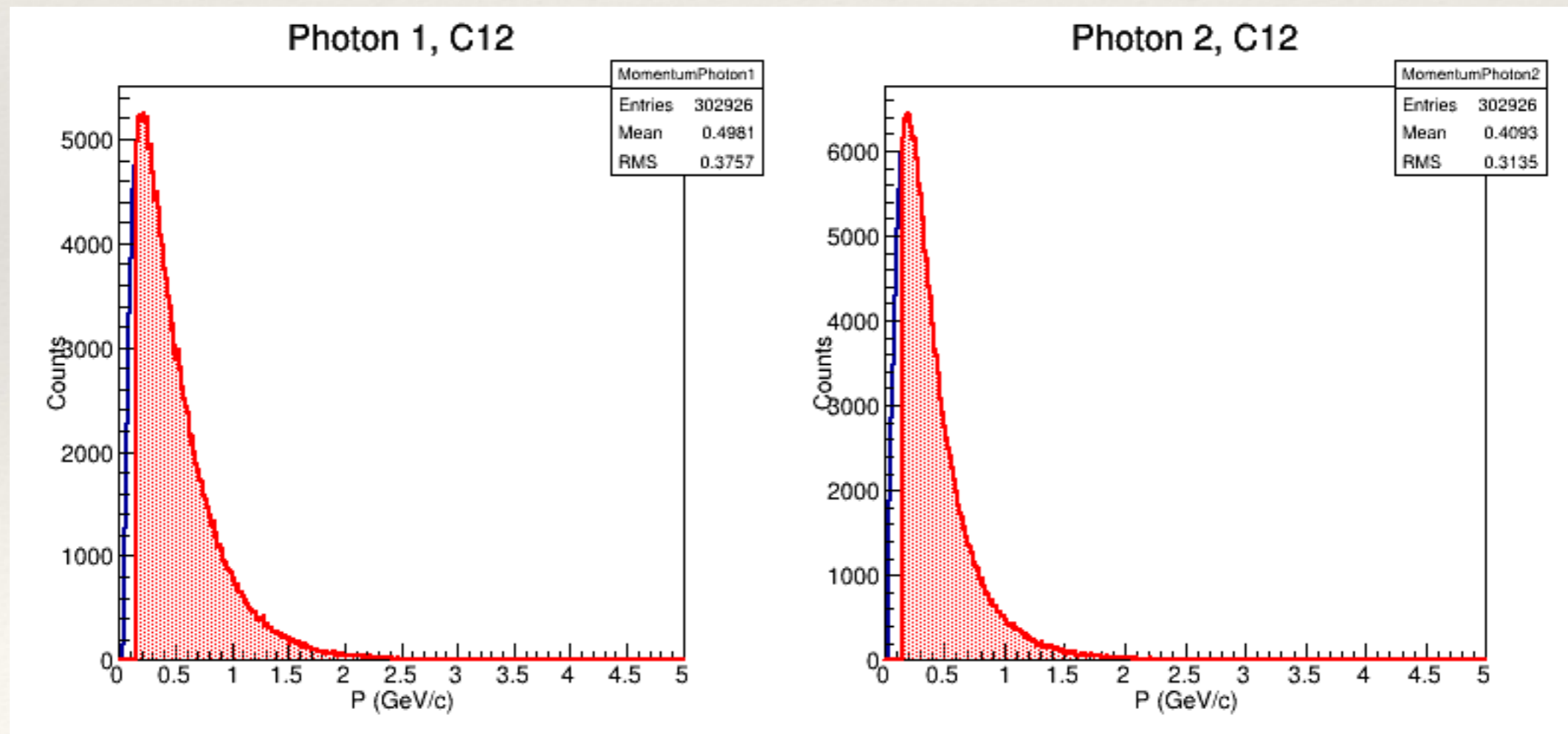
Cuts not applied

- CC # of photo-electrons
- DC fiducial region

EXPB Analysis: Photon ID
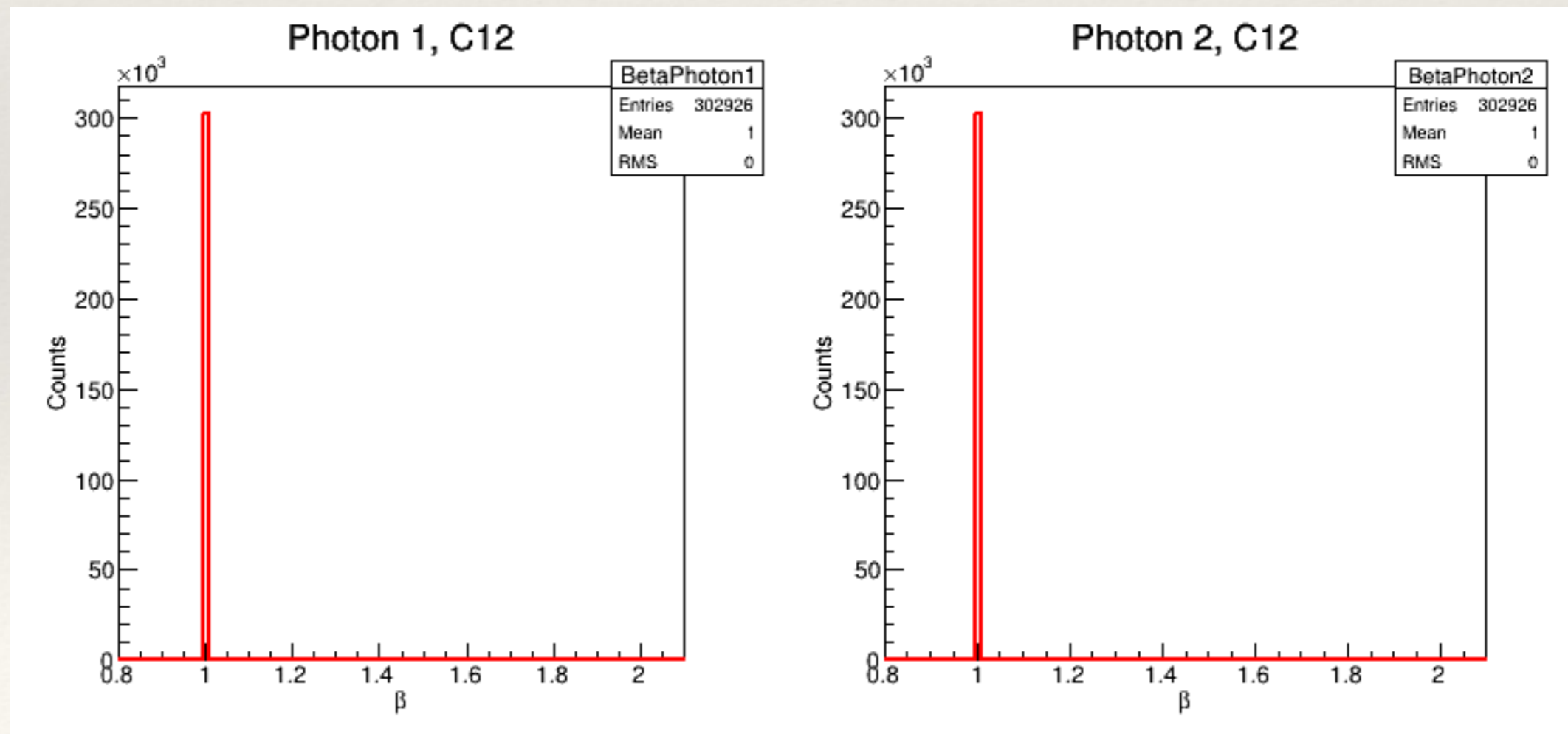
<u>Cuts applied to identify the photons</u>
- Momentum

EXPB Analysis: Photon ID

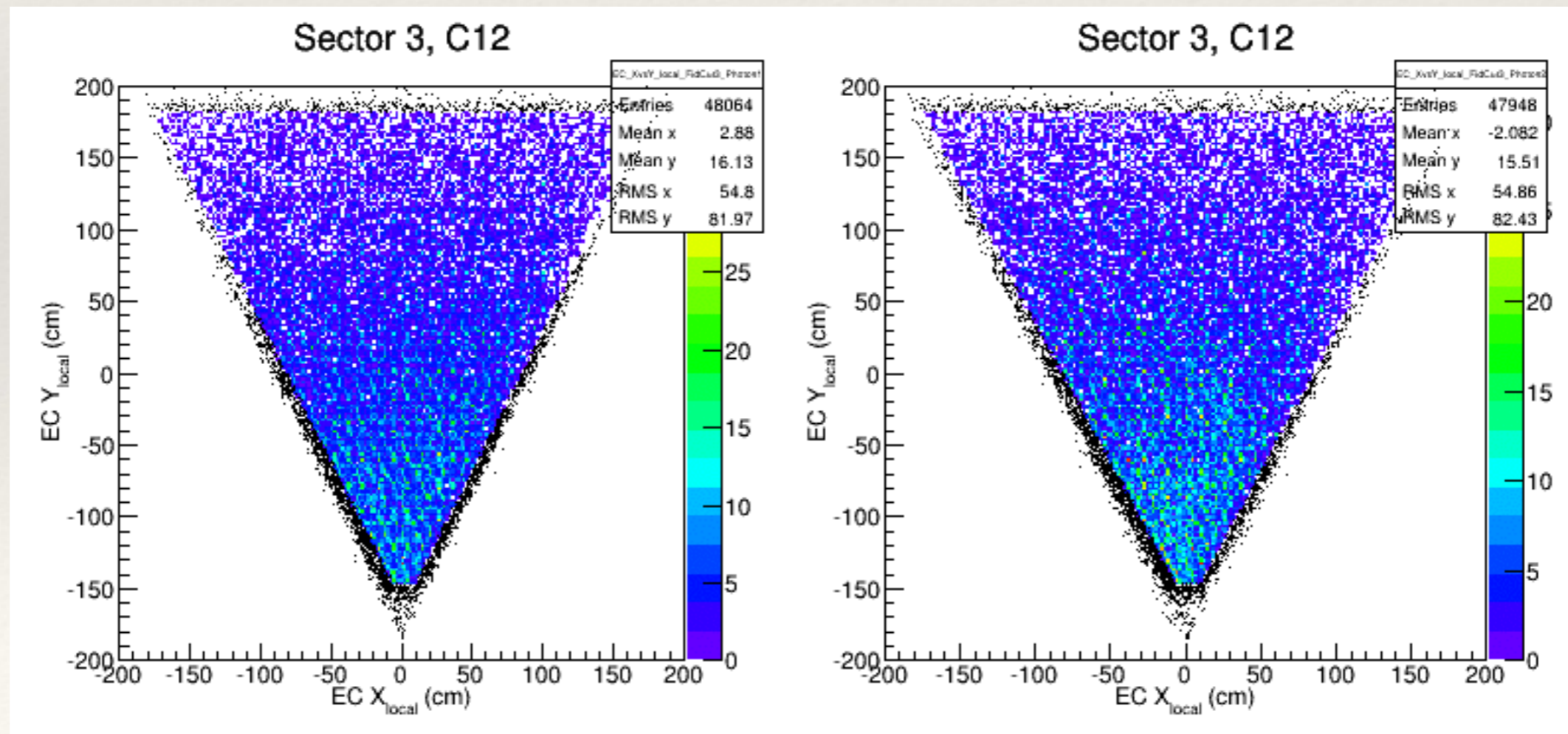Cuts applied to identify the photons

- Momentum
- Beta

EXPB Analysis: Photon ID
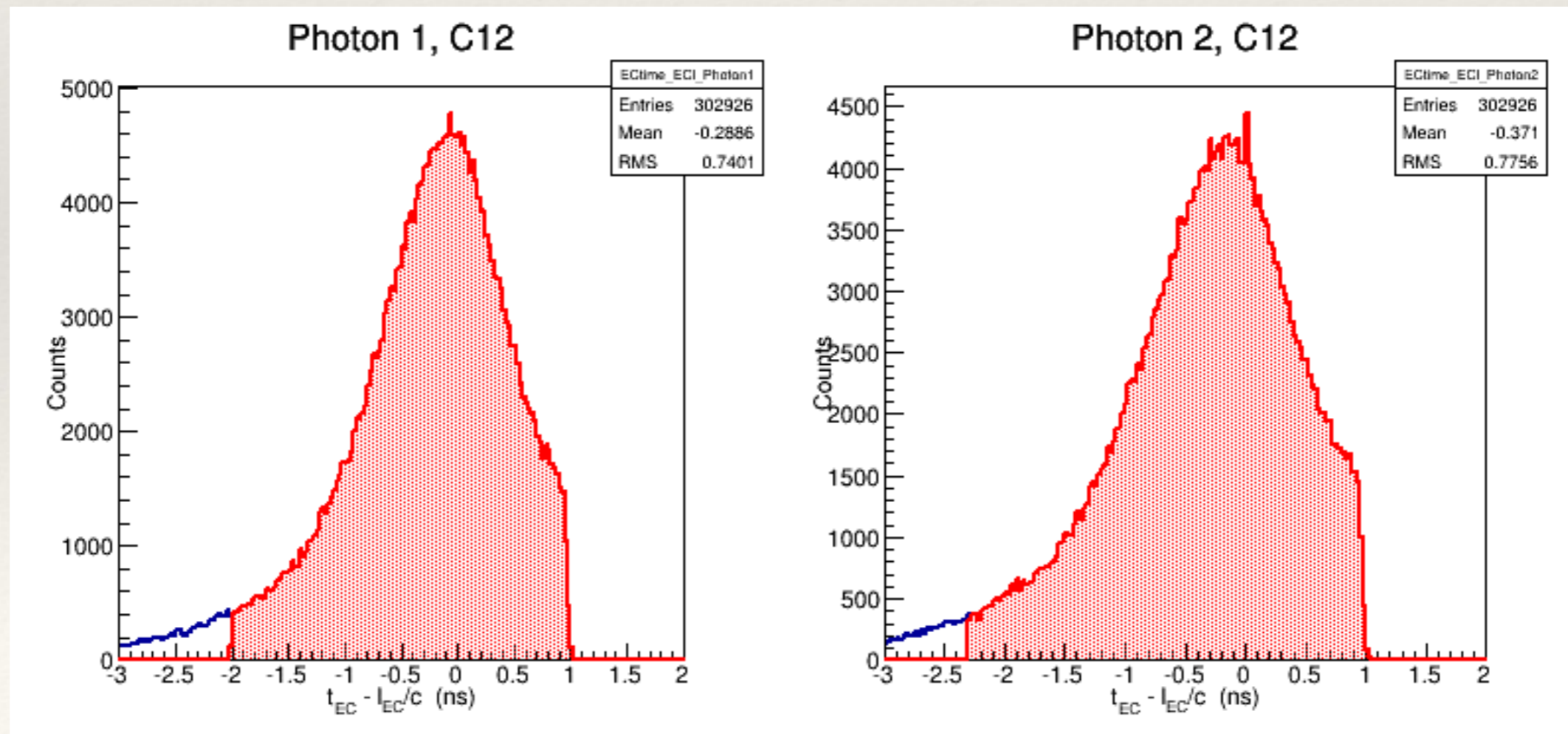
Cuts applied to identify the photons

- Momentum
- Beta
- EC fiducial region

EXPB Analysis: Photon ID

Cuts applied to identify the photons

- Momentum
- Beta
- EC fiducial region
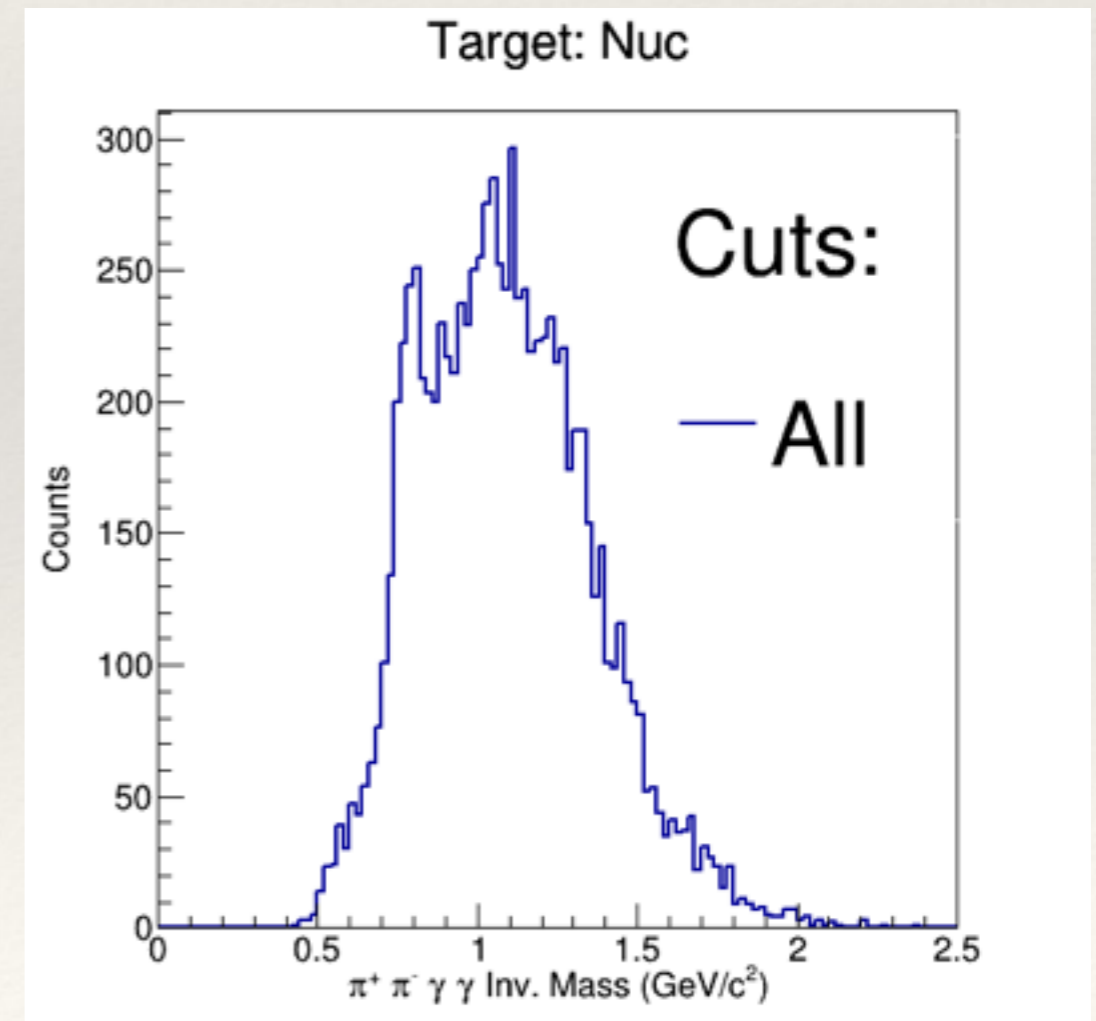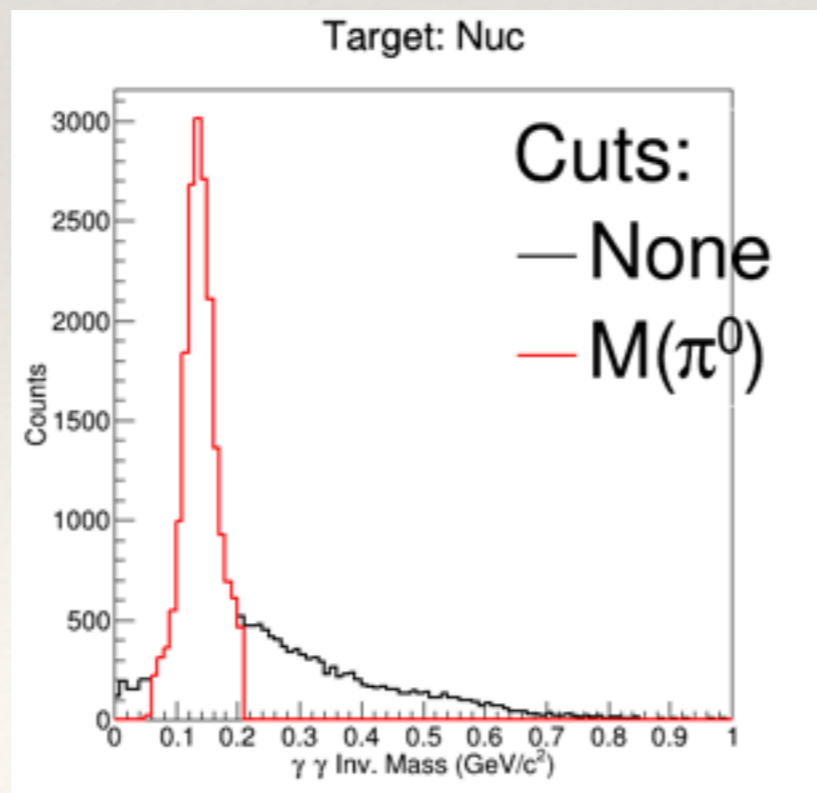- Difference between EC_{time} and EC_{path}/c

EXPB Analysis

Event selection: e-, pi+, pi-, 2 photons candidates.
Electron and photon ID cuts shown earlier.

Cuts:

- z-vertex matching between e- and other particles
- $Q^2 > 1$ GeV^2
- $W > 2$ GeV
- Angle between e- and each photon > 12°
- Reconstructed pi0 mass

Summary of EXPB Cuts

Number of candidate events after filtering = 302926

Electron ID

Cut	Momentum	EC	EC	EC/SC timing	EC fid.
% Surviving	85	79	89	93	66

Photon ID

Cut	Momentum	beta	Timing	EC fid.
% Surviving	75	100	91	86

Electron ID && Photon ID && Event Selection

Cut	Z-vertex	$\theta(e-, \gamma)$	Q2	W	Mass pi0	All
% Surviving	17	24	26	27	18	8

Background