

Study on the “high-Q2” background

Motivations:

- The photo-electron distribution in the HTCC for positrons (see Joseph slides) shows that some positrons have very few PhE in the HTCC. On the contrary the photo-electron spectrum for electron seems to be clean
- The background events have positron with low momenta and electron with high momenta

Hypothesis:

- Low momentum (below HTCC threshold) π^+ from the $ep \rightarrow ep \pi^+ \pi^-$ reaction are misidentified to positron.
- The electron and the falsely identified pion are then mistakenly identified as TCS/JPsi final state particles

Method:

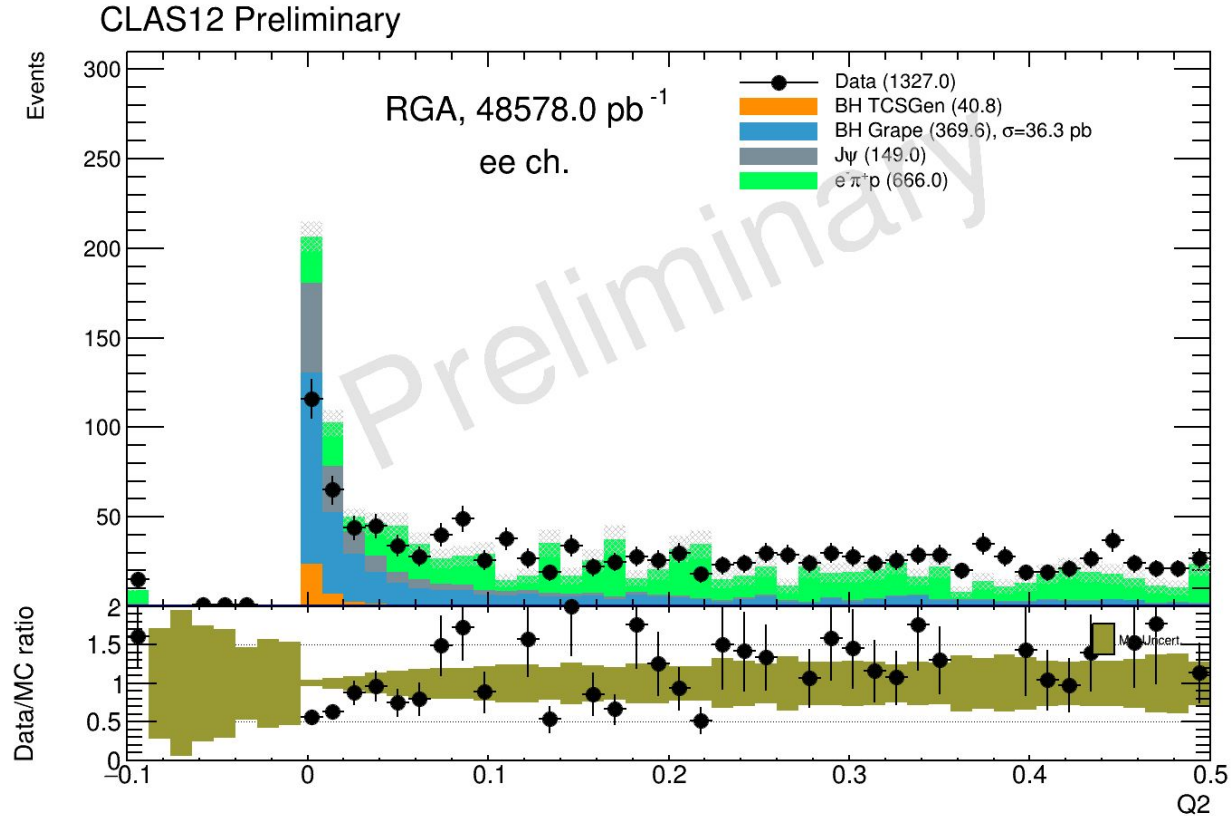
- Select DATA event with exactly 1 electron, 1 π^- and 1 proton, and allow anything else (including potential π^+)
- Assign the positron mass to the pion and run the TCS analysis code on these events
- Normalization done “by eye” to match the data. Here we are more interested in the phase space coverage and the shape of the background

Inbending Fall 2018

$\text{abs}(\text{MMass}^2) < 0.1$
 $\text{Theta_Prot} < 35^\circ$

$P_{\text{leptons}} > 1 \text{ GeV}$
 $\text{SF} > 0.15$

$E_g > 7 \text{ GeV}$
 $M > 2 \text{ GeV}$



$\text{abs}(\text{MMass}^2) < 0.1$

$\text{abs}(\text{Q2}) < 0.2$

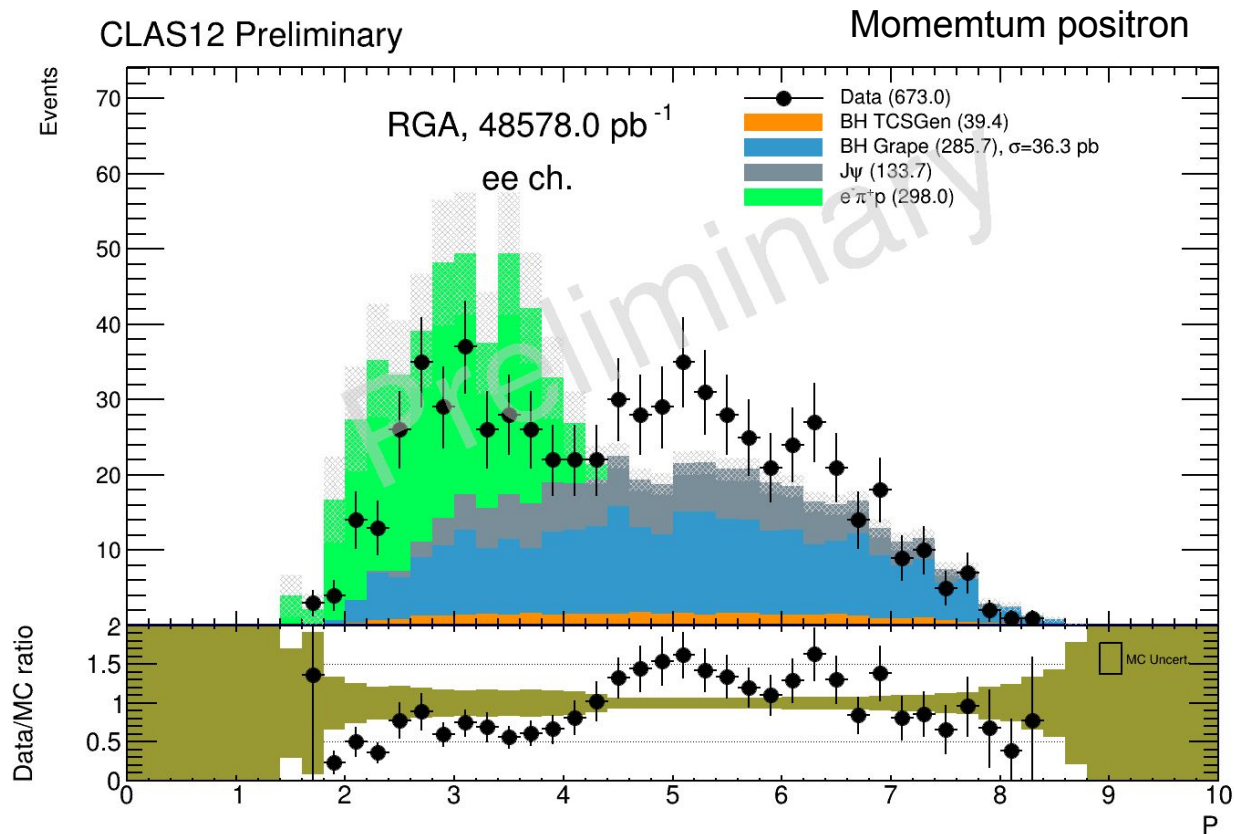
$\text{Theta_Prot} < 35^\circ$

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$\text{Eg} > 7 \text{ GeV}$

$\text{M} > 2 \text{ GeV}$



$\text{abs}(\text{MMass}^2) < 0.1$

$\text{abs}(Q^2) < 0.2$

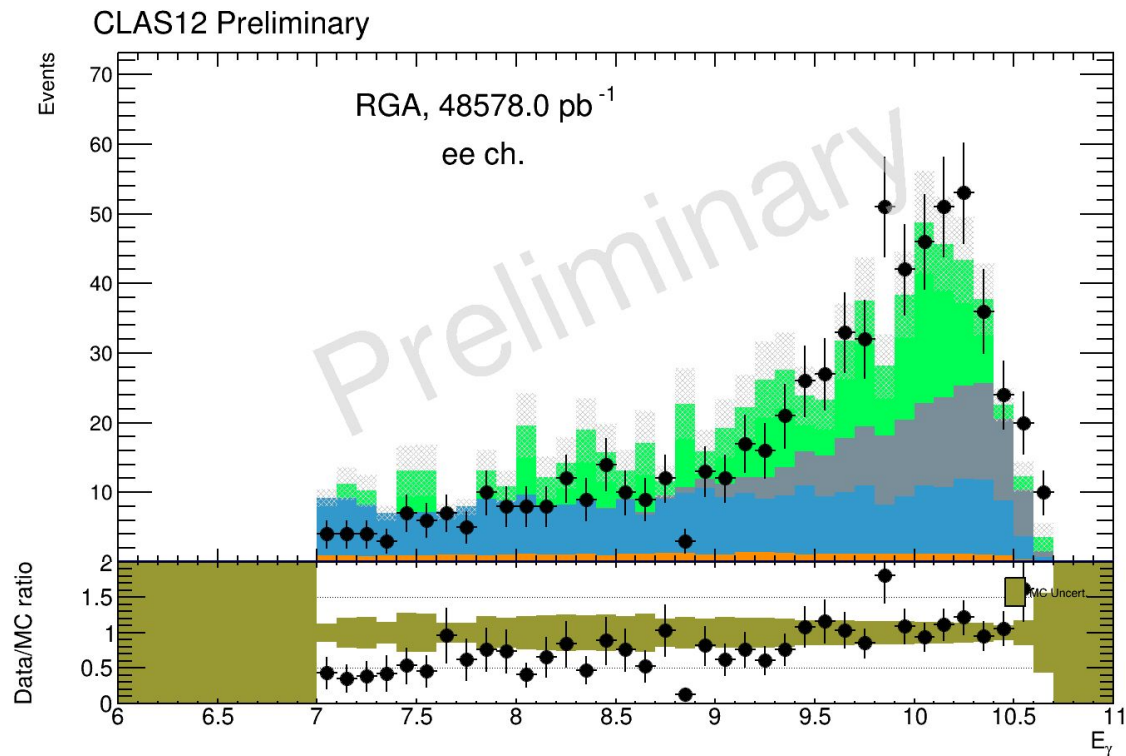
$\text{Theta_Prot} < 35^\circ$

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$E_{\gamma} > 7 \text{ GeV}$

$M > 2 \text{ GeV}$

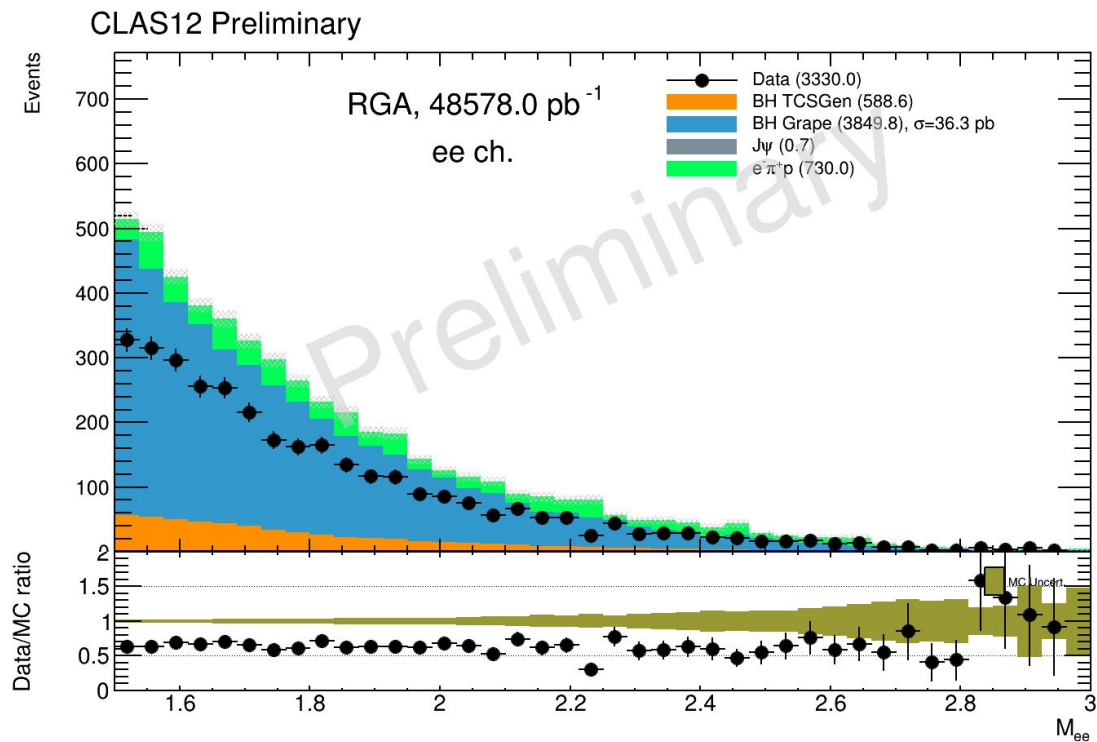


$\text{abs}(\text{MMass}^2) < 0.4$
 $\text{abs}(\text{Pt}/P) < 0.05$

$P_{\text{leptons}} > 1 \text{ GeV}$
 $\text{SF} > 0.15$

$1.5 \text{ GeV} < M < 3 \text{ GeV}$

TCS Mass range



Outbending Fall 2018

$\text{abs}(\text{MMass}^2) < 0.1$

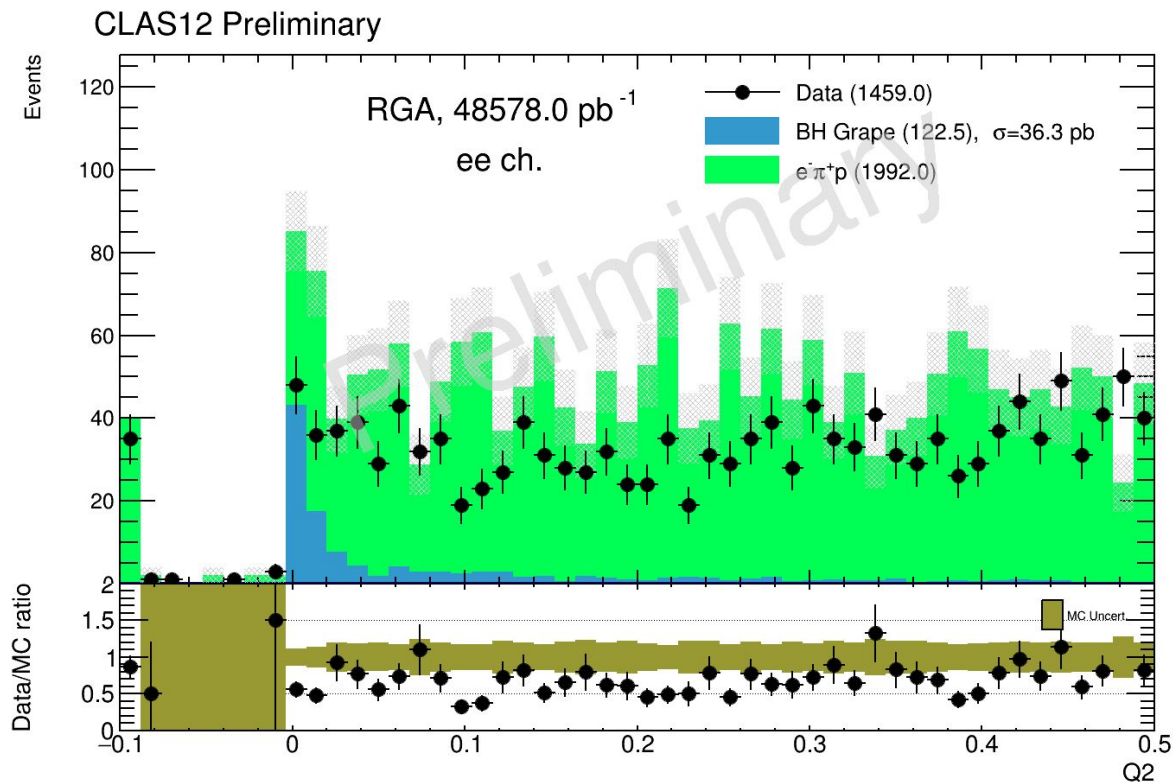
$\text{Theta_Prot} < 35^\circ$

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$P_{\text{leptons}} > 1 \text{ GeV}$

$E_g > 7 \text{ GeV}$

$\text{abs}(Q^2) < 0.2$

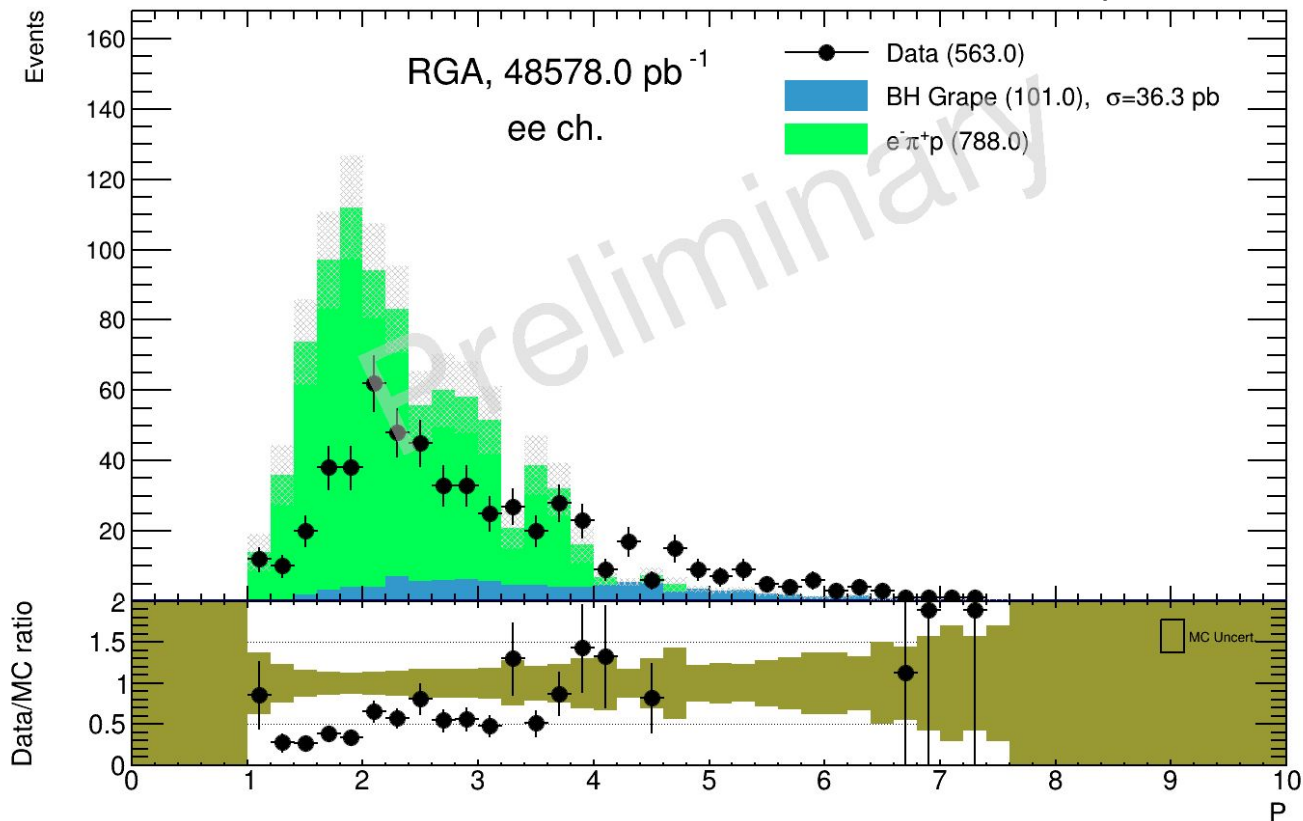
$SF > 0.15$

$M > 2 \text{ GeV}$

$\text{Theta}_{\text{Prot}} < 35^\circ$

CLAS12 Preliminary

Momentum positron



$\text{abs}(\text{MMass}^2) < 0.1$

$\text{abs}(Q^2) < 0.2$

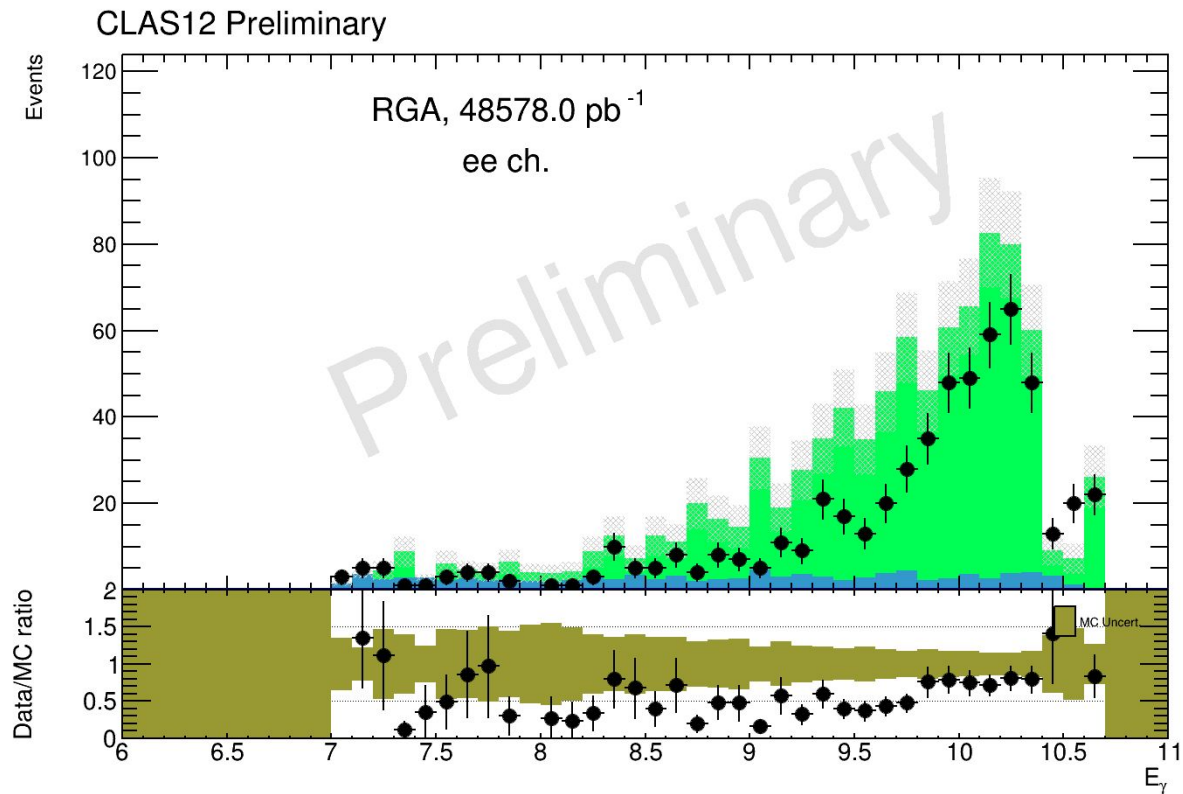
$\text{Theta_Prot} < 35^\circ$

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$E_{\gamma} > 7 \text{ GeV}$

$M > 2 \text{ GeV}$

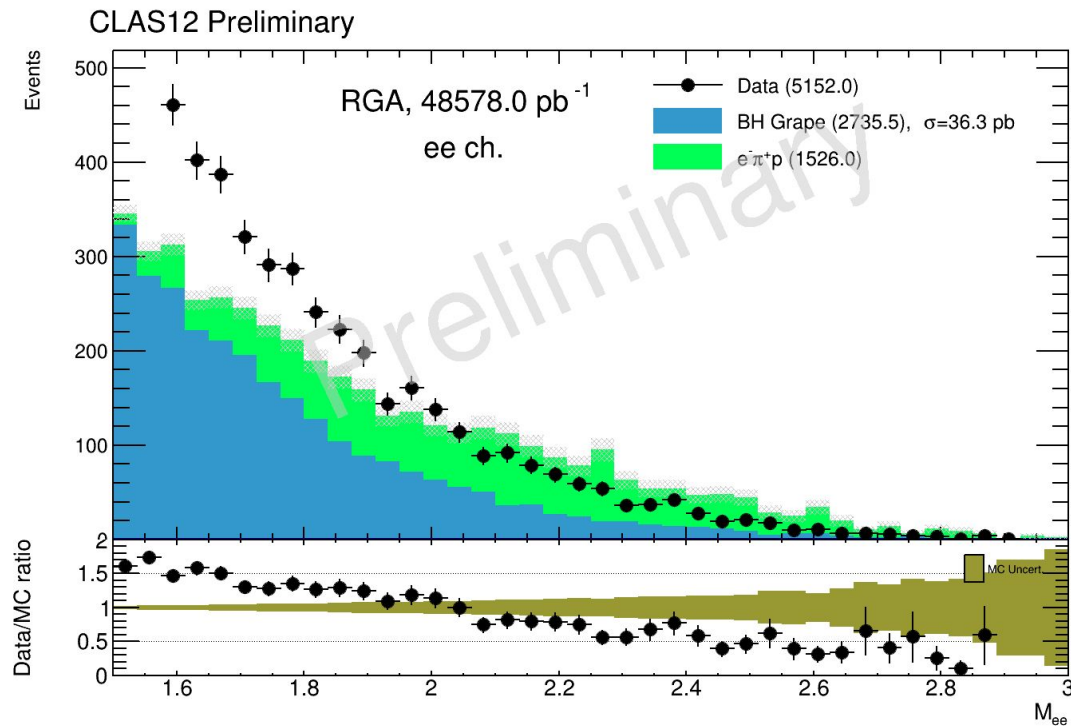


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TCS Mass range



Additional cross-check with Joseph
HTCC-Calorimeter sector matching for
electron and positron

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CLAS12 Preliminary - ee ch.

