

Bhabha Tracking Efficiencies

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Motivation

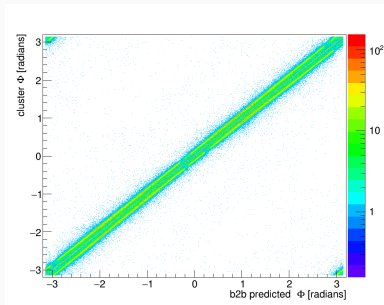
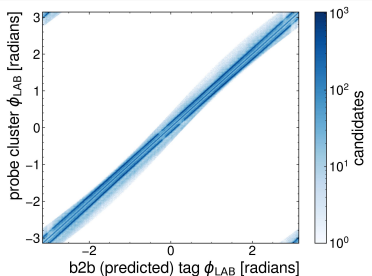
- I want to study the tracking efficiency of Bhabha processes
- For this I first take a look at electrons which are only detected by the ECL
- They are therefor labeled and treated as gammas
- In the next step I only take information from the ECL and count the electron there without the information from the tracking detectors
- Afterwards the number of tracks in the tracking detectors is count to get the efficiency

Getting Started

- Filling the gamma lists:
 - gamma:probe '(E > 0.1)'
 - gamma:tag '(clusterE > 3.0)'
 - vpho:cand 'reconstructed from gamma:probe and gamma:tag'
- All cuts were taken from Sam's studies:
 - $0.296706 < \theta < 2.61799 \rightarrow$ It has to hit the ECL
 - $\text{nCleanedTracks}[\text{abs(dz)} < 2.0 \text{ and } \text{abs(dr)} < 0.5 \text{ and } \text{nCDCHits} > 0 \text{ and } \text{pt} > 0.15] < 1 \rightarrow$ bad quality hits
 - $M(\text{vpho}) > 8.0 \text{ GeV} \rightarrow$ To cut away background (not from his email but surely he is using something like that)

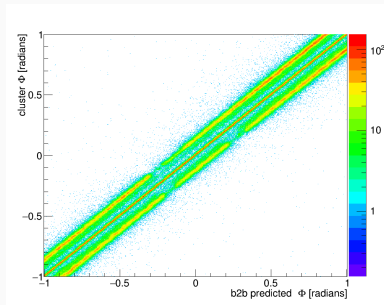
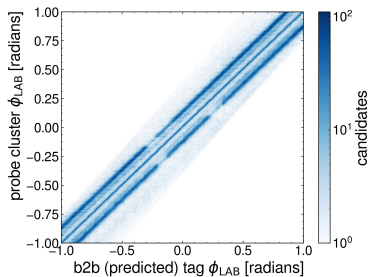
Reproducing Plots

- Sam used Prod6 on all of his plots, and since I try to reproduce his plots I will use it as well
- Sam used all Prod6 data. I am only using the following:
/hsm/belle2/bdata/Data/release-02-01-00/DB00000438
/prod000000006/e0003/4S/r02*/all/mdst.sub00/*.root
- Sam's plots are on the left.
- Three lines. The middle one is $\gamma\gamma$ the two others are ee



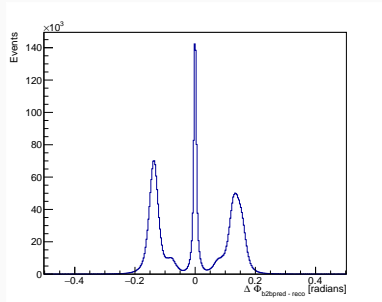
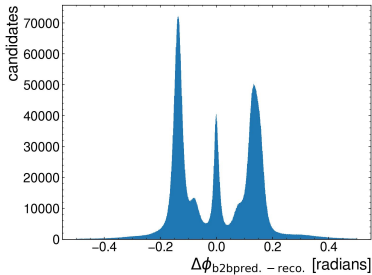
Reproducing Plots

Same plots but zoomed in:



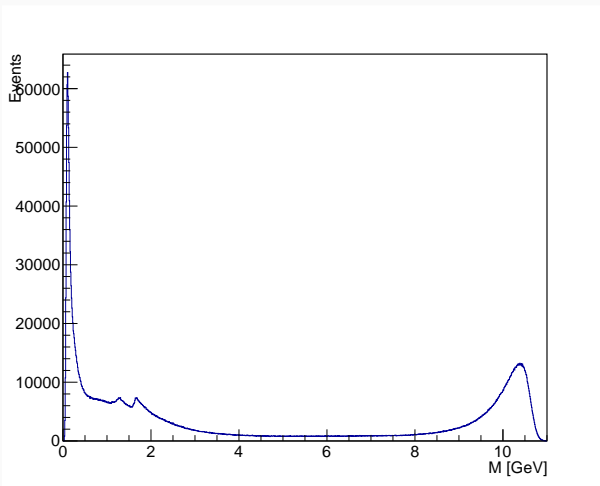
Reproducing Plots

- The middle peak is $\gamma\gamma$ the two other peaks are $e e$
- My $\gamma\gamma$ peak is way higher (Maybe there are some cuts that I am not considering?)

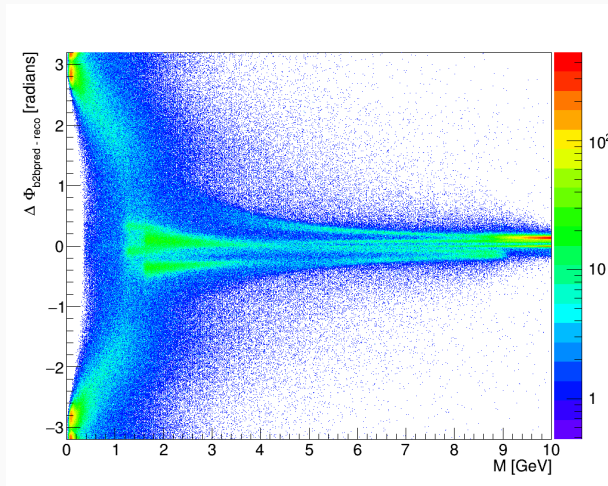


Some more plots

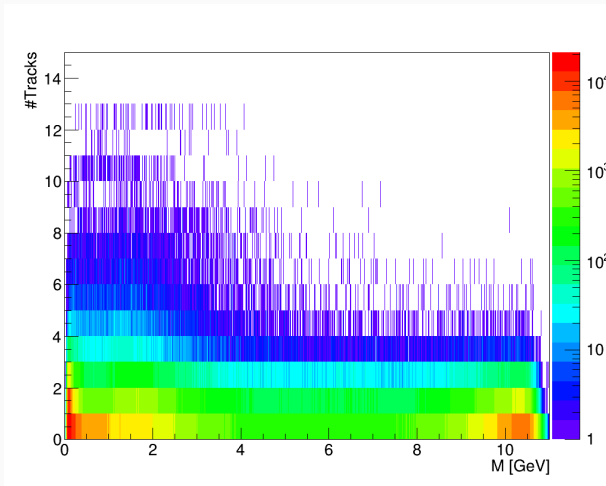
Here is no Mass cut on the νpho



Some more plots



Some more plots



The next Steps

- Investigate the best cuts for our purposes and apply them
- Select only the ee candidates and study the tracking efficiency using that sample
- Producing the same plots shown here using MC sample (from a preliminary study using MC10 it looks like very few events survive applying the described selection)