Monte Carlo simulations were done using the standard GlueX *sim-recon* package to estimate the contribution to the event rate coming purely from the electromagnetic beam background. The simulation used the standard GlueX geometry which included the FCAL lead-glass calorimeter at its nominal position and the Forward Drift Chambers (FDC) installed, also in the nominal position. The simulation consisted of sampling photons from the full coherent bremstrahlung energy photon spectrum at a rate consistent with 4×10^7 tagge γ/s running. A 100ns time window was sampled. The results shown here therefore consist of events where a single beam photon contributed to the detector response as well as events where multiple beam photons contributed. In the real experiment, tight timing cuts may be applied than the 100ns window used here so the current study may be considered an upper limit.

Also used in the study was the application of two candidates being considered for the standard GlueX level-1 trigger. Theses are defined as:

L1a :
$(E_{BCAL} + 4 * E_{FCAL}) > 2GeV \& (E_{BCAL} > 200MeV) \& (E_{FCAL} > 30MeV)$

L1b :
$(E_{BCAL} + 4 * E_{FCAL}) > 2GeV \& (E_{BCAL} > 30MeV) \& (E_{FCAL} > 30MeV) \& (N_{SC} > 0)$

where SC indicates the Start Counter.

Neither of these algorithms are well tuned for the proposed experiment which would employ a tighter cut on the deposited FCAL energy and no requirement on the BCAL energy or start counter. This, again, points to these results as an upper limit on expected EM background rates.

Figure 1 shows the number reconstructed photons per event in the FCAL for events passing the level-1 triggers described above. Since both level-1 triggers require energy in the FCAL, the bin at $N_{photons} = 0$ is empty. Figure 2 shows the total reconstructed energy in the FCAL. Residual energy not included in a reconstructed photon is not included in this plot. Figure 3 shows the invariant mass of all reconstructed FCAL photons for events with at least 4 reconstructed photons. The histogram has been scaled by the 5 seconds of beam time simulated to make the y-axis in units of trigger rate per 2MeV of invariant mass. The plot indicates that background rate from pure EM triggered events that reconstructed to something close to the η invariant mass will be very small. The integral of the plot indicates the level-1 trigger rate contribution due purely to electromagnetic background is approximately $4.2kHz$.

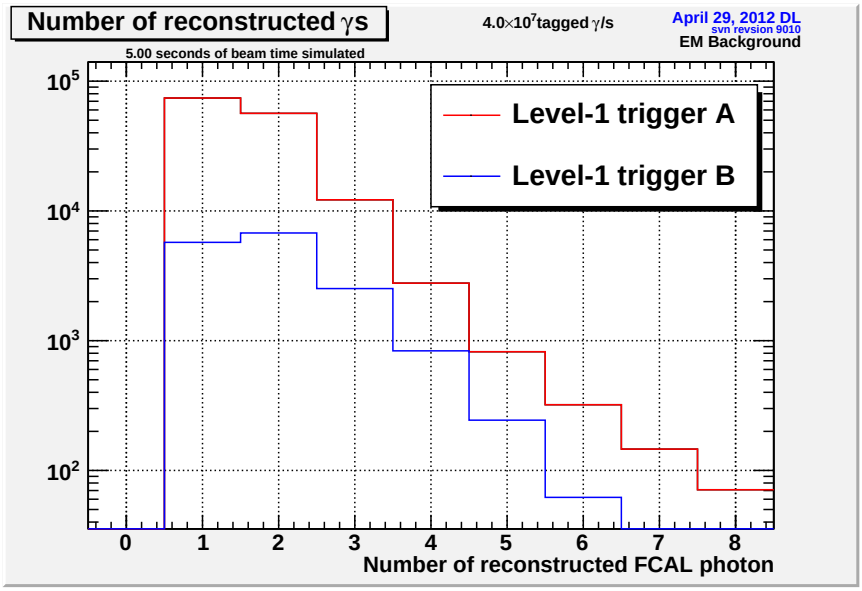

Figure 1: Number of reconstructed photons in GlueX FCAL for events triggered by electromagnetic beam background.

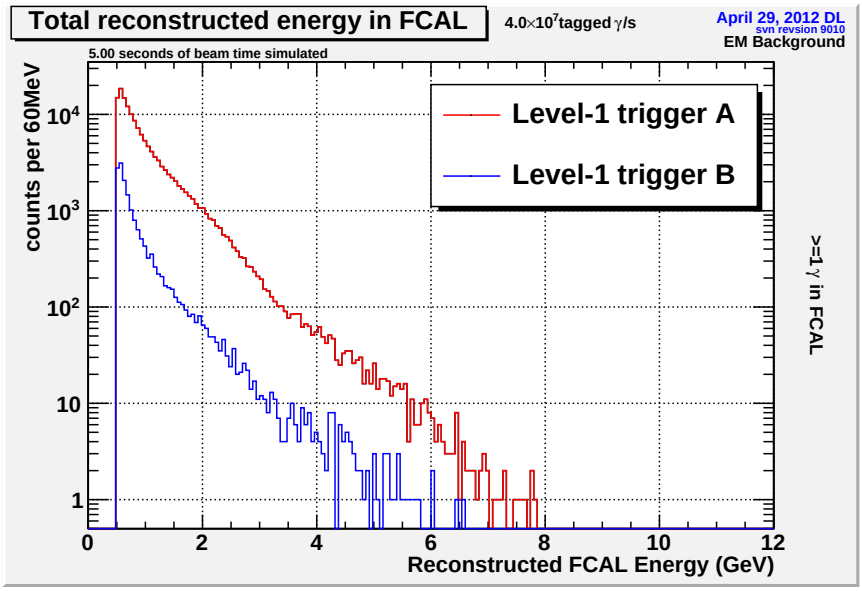

Figure 2: Energy sum of all reconstructed photons in GlueX FCAL for events triggered by electromagnetic beam background.

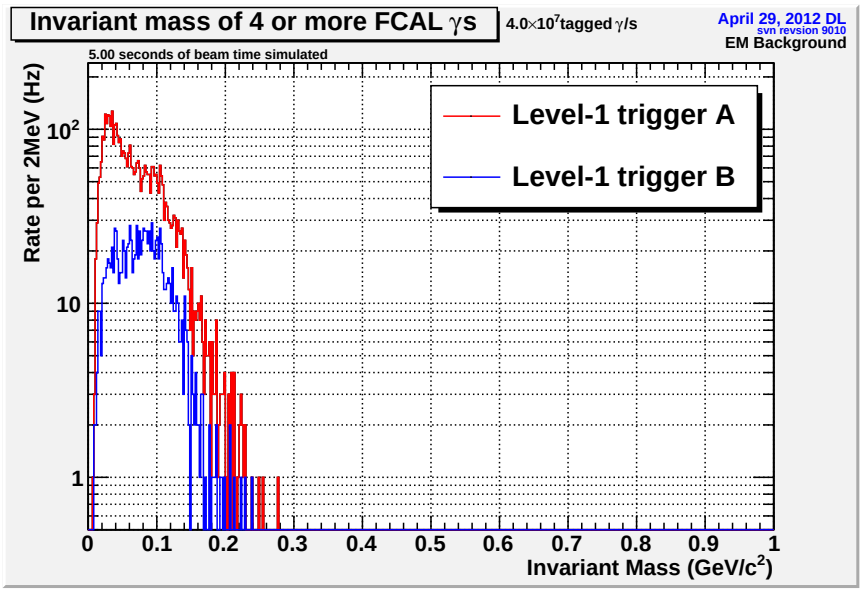

Figure 3: Invariant mass of all reconstructed photons in GlueX FCAL for events triggered by electromagnetic beam background that have at least 4 reconstructed photons.