Steve’s Calorimeter Energy Distributions

Expectation: Events will be typified by low energy deposited in the CAL
Data cut on a valid 3-in-a-row which starts in Layer 15

TK argues:
Take the two right panels above. They will give problem for 20-200MeV gammas. Source count of 50k at 100MeV (assume 100MeV bin) corresponds to >1 year observation (10^7s) of a few 100mCrab source. Number of albedo photons to be compared with the source count (10^7s) should have been ~10^{10} or 2x10^5 higher than shown above. (Here 1/5 of gammas are assumed to trigger.) We can eliminate most albedo photons by our angular resolution represented by PSF. PSF (fwhm) at 100MeV is 2.3x3.5deg square = 4msr = 0.002 of LAT fov. So we should multiply the right two panels by ~400 for one Crab point source. If we claim to detect few mCrab sources (we’d better be), we have to multiply the 2 right pannels by >10^5 !!! Even with very effective on-board filtering and off-line rejection scheme, we should go after additional reduction factors.
Steve’s Negative Impacts? (II)

• There are two categories of background that will likely be worsened with additional tracker material:

  – horizontal primary particles (not tracked) that interact in the additional material creating secondaries that either look like, or are, gammas. The lowest row of ACD tiles were added to help reject these in the last layers of the TKR, however the efficiency requirement on these tiles is less strict since no candidate gammas come from this region. Additional converter (which does not add effective area for science) will be a target for background generation.

  TK: Conversion in the added tungsten foils is least likely give L1T trigger unless the event splashes upward and downward at the same time.

  – a major advance of GLAST over EGRET is the lack of a TOF system, enabling a much larger FOV. It is necessary for the instrument to distinguish upward from downward-going energy by other means. One method of removing upward gammas from primary interactions in the CAL is requiring a found track to be somewhere close to the CAL. The additional material will convert ~6% more upward-going photons closer to the CAL, removing this useful distinction. The additional converter in the TKR will make the problem of upward-going event rejection worse.

  TK: This is against what we found in BFEM. The higher the threshold for electrons crossing the bottom 3 trays, the less will be triggers from upward splash from CAL
Steve’s Extra-G Background vs Albedo Gammas

TK: Need a little more info on this plot. If ~3 events/s are left over ~2sr (the left Table), the emissivity (total flux/solid angle) will be $1.5 \times 10^{-3}$/s/msr. Ext-Gal Gamma-ray Background per msr will be $\sim 10^{-10}$ (number/cm$^2$/s/MeV/msr at 100MeV) x 3000cm$^2$ x 100MeV = $3 \times 10^{-5}$/s/msr. Hence we need rejection (off-line) of ~3 orders of magnitude to get the right panel. If we do, TK’s worry will be gone.