ACD Count Rates

VETO Rates

From EGRET A-dome rates, the on-orbit counts rates vary from ~0.3 Hz/cmsq to 1.5 Hz/cmsq. These are an overestimate for LAT, because the ACD thresholds will be substantially higher than the corresponding thresholds on EGRET. Therefore, this represents a worst case.

Minimum Cutoff (~4GV) => maximum rate

For top tiles, rate is 1.5 x 34^2 cmsq	~1700 Hz
For smallest tiles, rate is 1.5 x 34 cm x 15 cm	~750 Hz
For large tiles, rate is 1.5 x 170 cm x 15 cm	~3800 Hz

Maximum Cutoff (~17 GV) => minimum rate

For top tiles, rate is 0.3 x 34^2 cmsq	~340 Hz
For smallest tiles, rate is 0.3 x 34 cm x 15 cm	~150 Hz
For large tiles, rate is 0.3 x 170 x 15	~760 Hz

Solar Flares - Rates can increase by a factor of >100

For top tiles, rate could be 60 x 34^2 cmsq	~70 kHz
For smallest tiles, rate could be 60 x 34 cm x 15 cm	~30 kHz
For large tiles, rate could be 60 x 170 x 15	~150 kHz

HLD_OR Rates

Instead of EGRET rates, use 1% of total primary cosmic-ray flux, because the backgrounds that raise the VETO rates above that predicted from the primary flux won't contribute to the HLD rates.

Minimum Cutoff (~4GV)

For X-side HLD_OR's, rate is
0.01 x (7 x 34^2 cmsq + 2.5 x 34 cm x 55 cm) x 0.1 Hz/cmsq/sr x 3 sr ~40 Hz

For Y-side HLD_OR's, rate is
0.01 x (5 x 34 cm x 55 cm) x 0.1 Hz/cmsq/sr x 3 sr ~30 Hz

Maximum Cutoff (~17 GV)

For X-side HLD_OR's, rate is
0.01 x (7 x 34^2 cmsq + 2.5 x 34 cm x 55 cm) x 0.01 Hz/cmsq/sr x 3 sr ~4 Hz

For Y-side HLD_OR's, rate is
0.01 x (5 x 34 cm x 55 cm) x 0.1 Hz/cmsq/sr x 3 sr ~3 Hz

Solar Flares

Little change expected

VETO-Based Primitive Rates

The VETO-based primitives rates vary widely depending upon how may tiles are involved and also how many tiles are required to be hit.

4-tile "supertile"

4x the rate for a top tile — 1400-6800 Hz normally; 280 kHz for solar flare

Top 5x5 array, exactly 1 hit

25x the rate for a top tile — 8500-42,000 Hz normally; 2 MHz for solar flare

Top 5x5 array, exactly 2 hits

This requires an electron shower or a nuclear interaction in the calorimeter; assume that the normal rate will be down x10 from the singles rates: 850-4200 Hz

Solar flares will produce a much smaller effect here than that for singles because of the steep spectra; assume 25x less: 80 kHz.

Top 5x5 array, 3 or more hits

Comparable with the "exactly 2" rates — 850-4200 Hz normally; 80 kHz for solar flares.

Side array exactly 1 hit

About half the rate from the top array — 4200-21,000 Hz normally; 1 MHz for solar flare

Side array, exactly 2 hits

More than half the top "exactly 2" rate because of proximity of calorimeter; assume 3/4 of top rate — 640-3200 Hz normally; 60 kHz for solar flare

Side array, 3 or more hits

Similar to "exactly 2" rate — 640-3200 Hz normally; 60 kHz for solar flare

AND of X(or Y)-sides (exactly 1 each side)

Geometry factor from A^2/L^2 (an overestimate) is ~7200 cmsq-sr; use 5500 x (0.01 to 0.1) Hz/cmsq/sr. With 3 sr, rate is: 160-1600 Hz normally

This is a calibration mode, and hopefully won't be in use during a solar flare, so we don't care much about the solar flare rates, which won't increase much anyway.

HLD Primitive Rate

Derived in a manner similar to that for the HLD_OR's

Minimum Cutoff (~4GV)

0.01 x (170x170 + 4x170x55) cmsq x 0.1 Hz/cmsq/sr x 3 sr ~200 Hz

Maximum Cutoff (~17 GV)

0.01 x 66,300 cmsq x 0.01 Hz/cmsq/sr x 3 sr ~20 Hz

Solar Flares

Little change expected