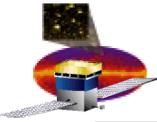


GLAST Large Area Telescope: TKR Readout Controller Buffer Limit

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TKR

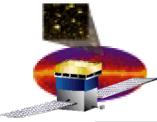
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GTRC Hit Buffer Issue

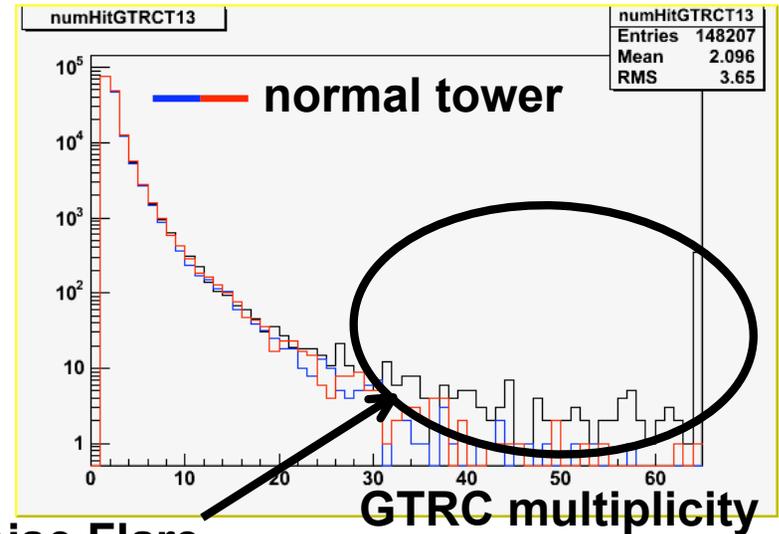
- **Tracker Readout Scheme.**
 - 8 GTCC (Tracker Cable Controller) per 1 tower.
 - 9 GTRC (Tracker Readout Controller) per GTCC.
 - Hit buffer (FIFO) limit: 128.
 - Readout GTRC from bottom to top.
 - 12 GTFE (Tracker Front-End), 768 strips per GTRC.
 - Hit buffer limit: 64.
 - Readout GTFE from end to center.
- **GTCC FIFO full error.**
 - GTCC FIFO fill up presumably due to shower events.
 - When this happens, hits from upper layers are truncated.
 - Bottom layers are often saturated as well. (=useless)
 - Upper layers may not be saturated.
 - Upper layers are more important for track reconstruction.
 - Event rate: $\sim 10^{-4}$.
 - GTCC FIFO full may be mitigated by limiting GTRC buffer to 14.
 - $14 \times 9 = 126 < 128$.

<http://www-glast.slac.stanford.edu/software/AnaGroup/Leon-2005Sep12-Truncation.pdf>

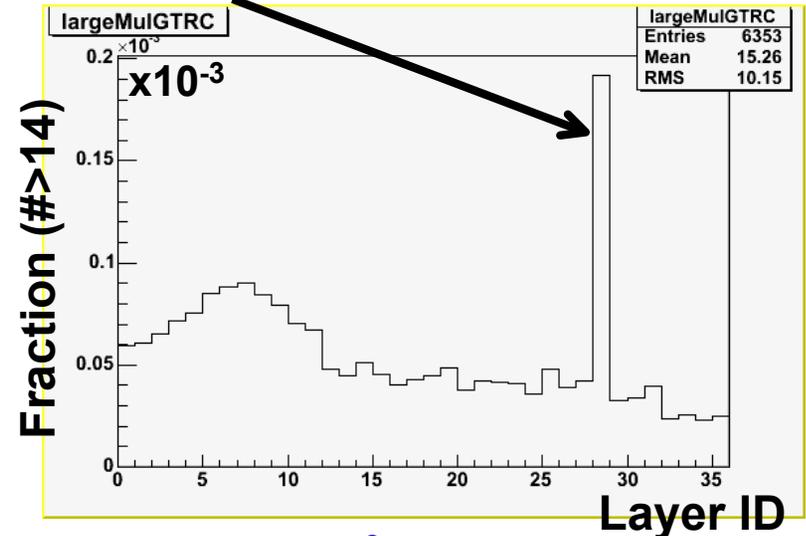


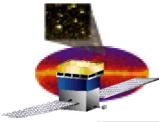
Effect of GTRC Buffer Limit

- Advantages of GTRC buffer limit at 14.
 - Reduce the effect of noise flare.
 - Noise flare events have large multiplicity (>20).
 - Gain experience with different GTRC buffer setting.
- Possible impacts on LAT.
 - No major effect expected.
 - Leon’s study shows no visible effect on tracking.
 - Loss of hits.
 - Rate is very low ($<10^{-4}$)
 - Much less than inefficiency.
 - Less effect on upper layers.



Noise Flare





Action Plan

- **STR-37 (special test request)**
 - Run B/2 and B/30 runs for 30 minutes each (~1M events).
 - Confirm no major negative effect from GTRC buffer limit at 14.
 - Any subtle effect requires much longer test.
 - Any effect from real photons requires further MC studies.
- **My recommendation (request).**
 - Move to new GTRC buffer setting after successful STR-37.
 - Useful to catch any subtle effect.
- **Further studies (short term).**
 - Fraction of events affected (data/MC).
 - Correlation with GTCC FIFO full condition.