

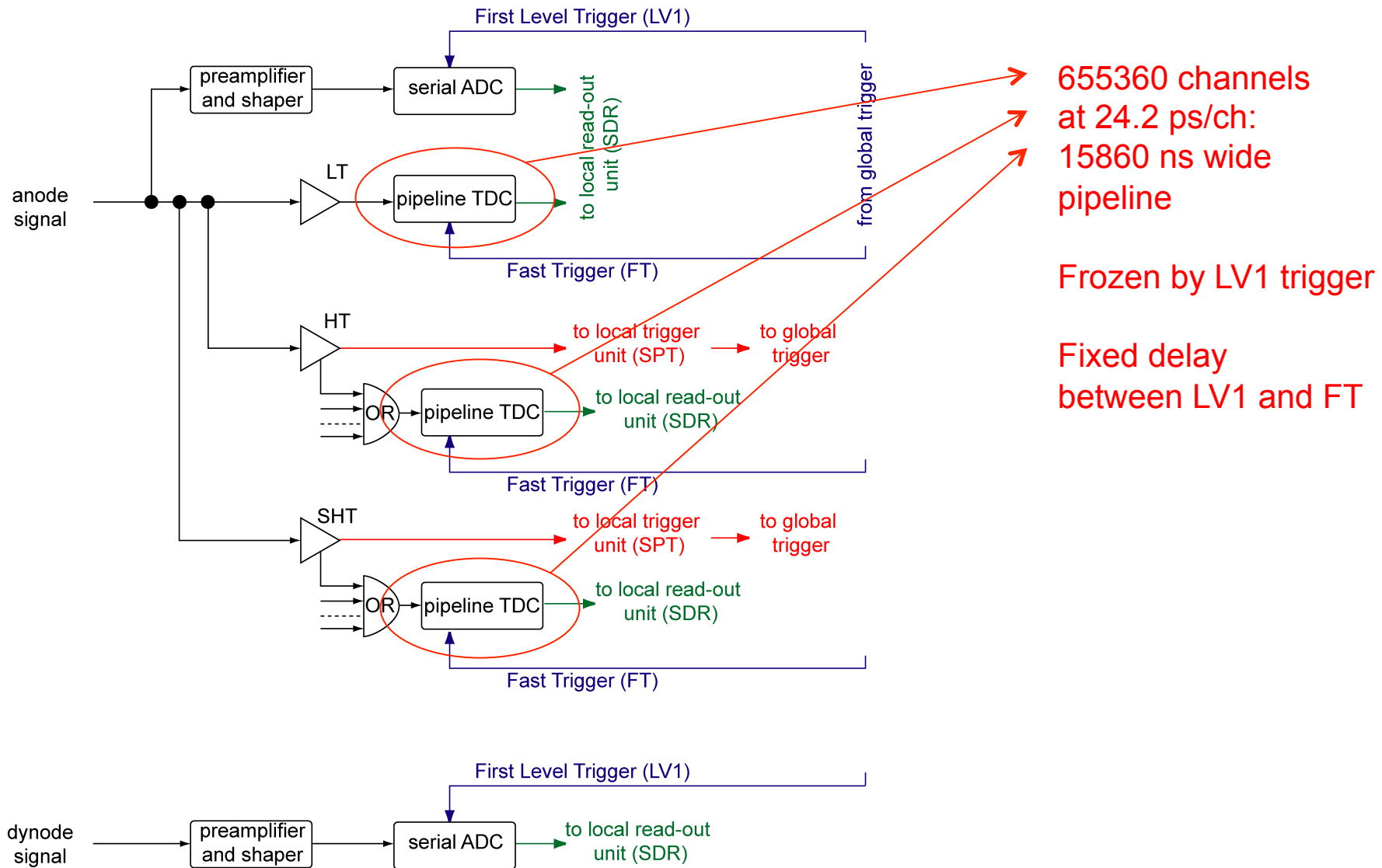
TOF absolute rate

A. Contin for the AMS-TOF Group

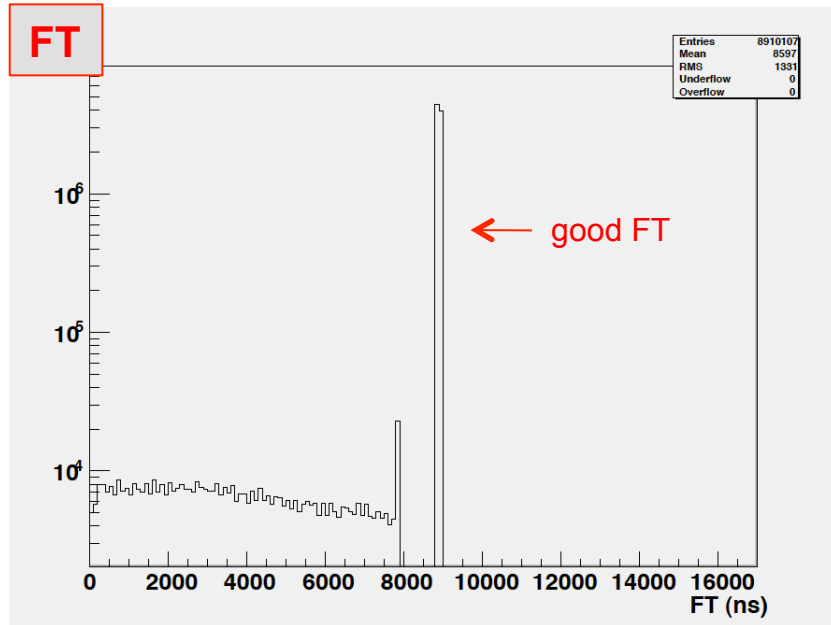
GroupA Meeting, 18/10/2012

Off-time signals

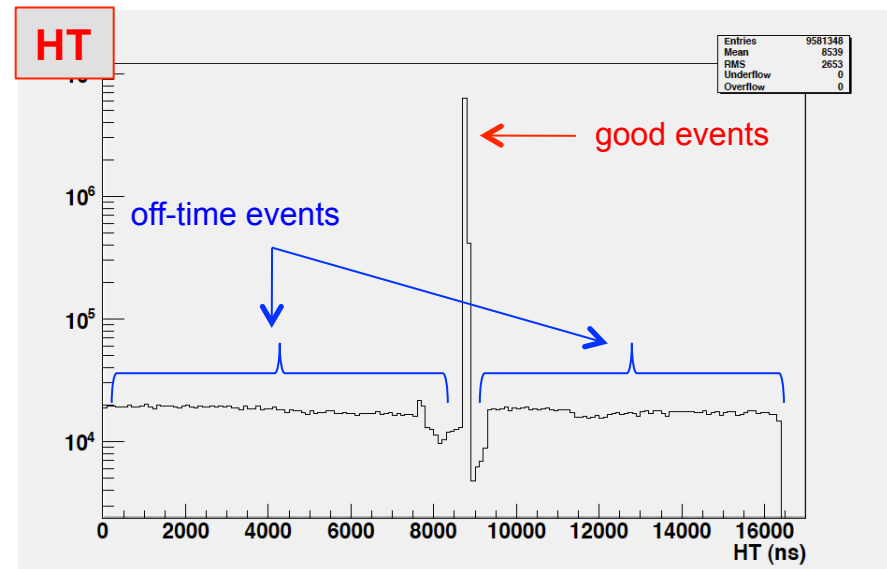
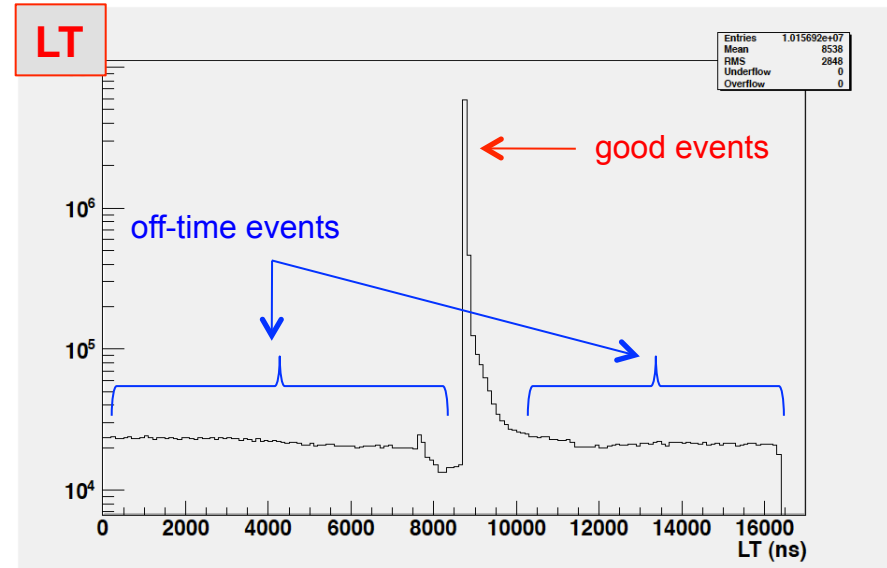
TOF time signals and the Fast Trigger are registered on pipeline TDCs



Off-time signals



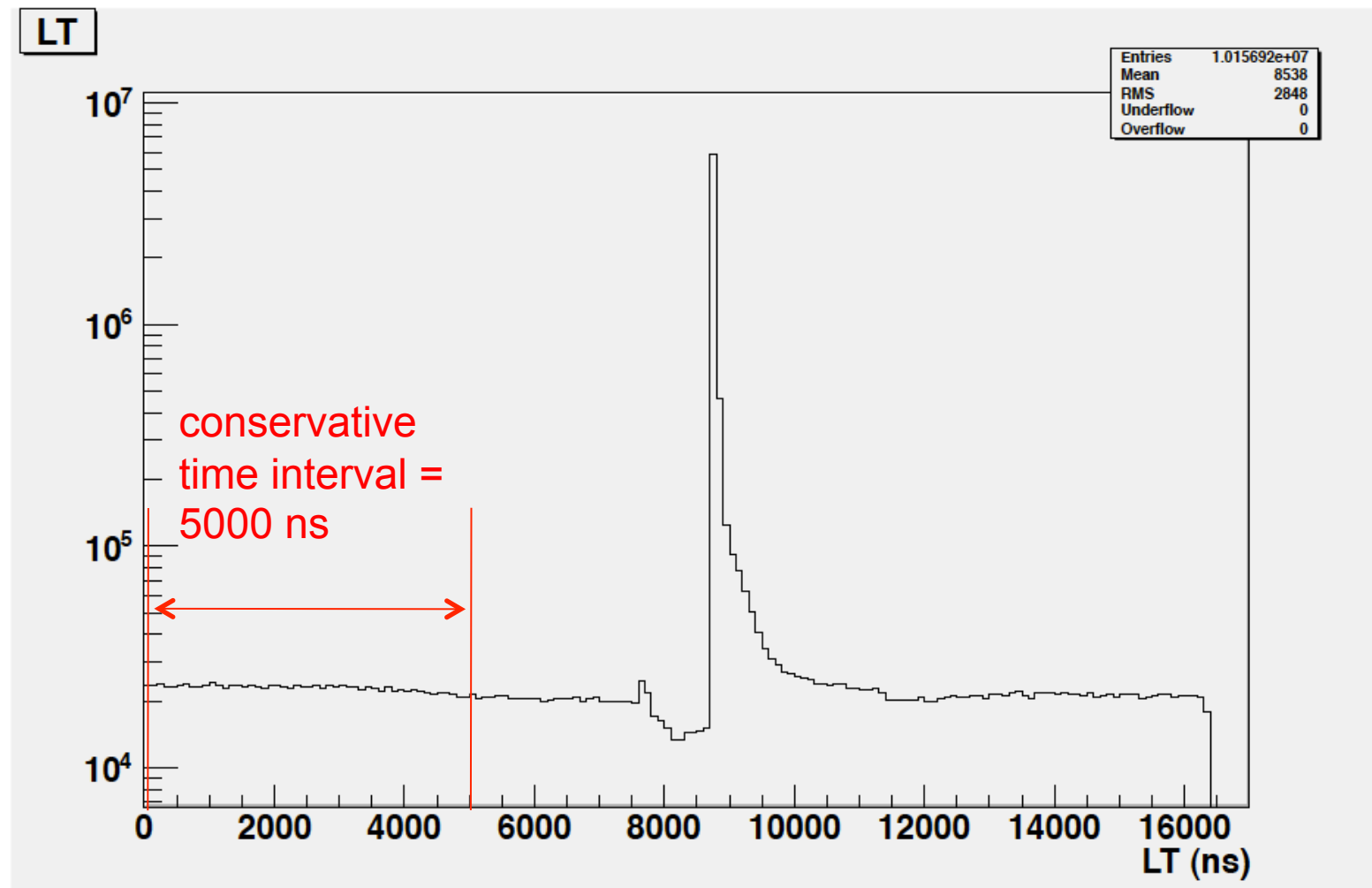
FT not confirmed by LV1 no extra FT because of LV1 busy



By combining off-time events on both sides of one counter, the absolute rate on that counter can be computed.

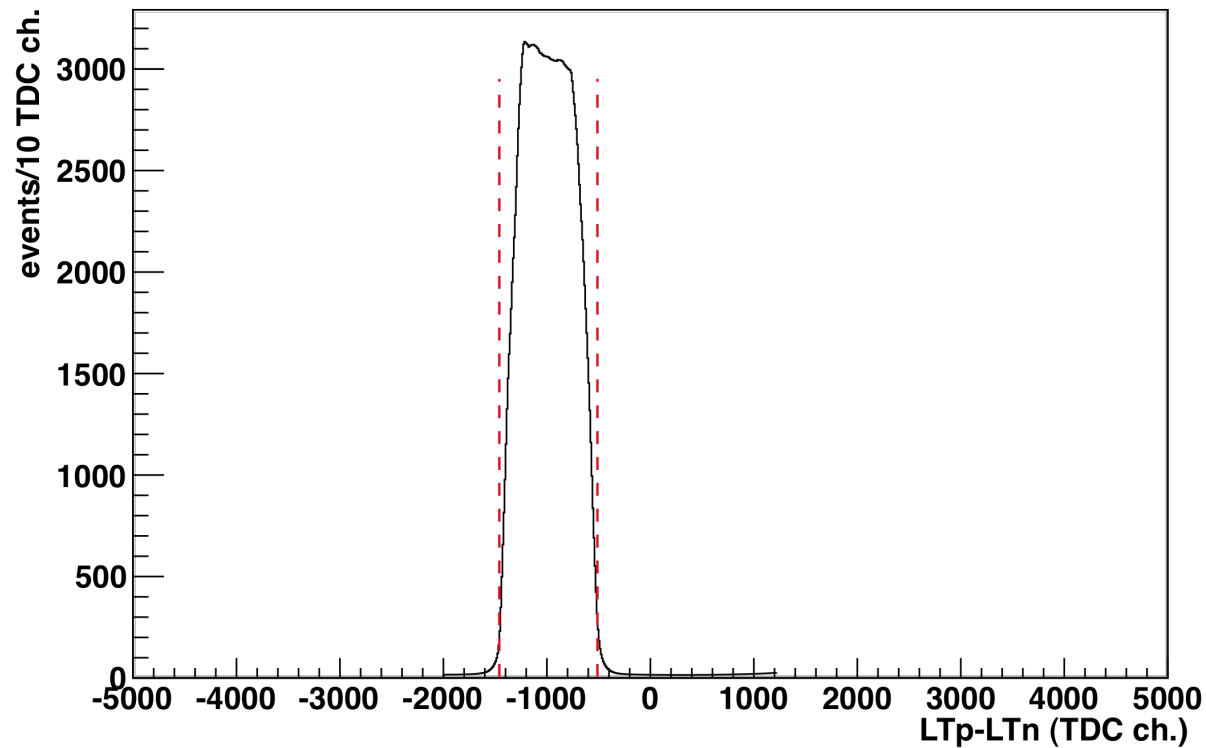
The live time is the number of analyzed events multiplied by the TDC interval considered.

Off-time signals – live time



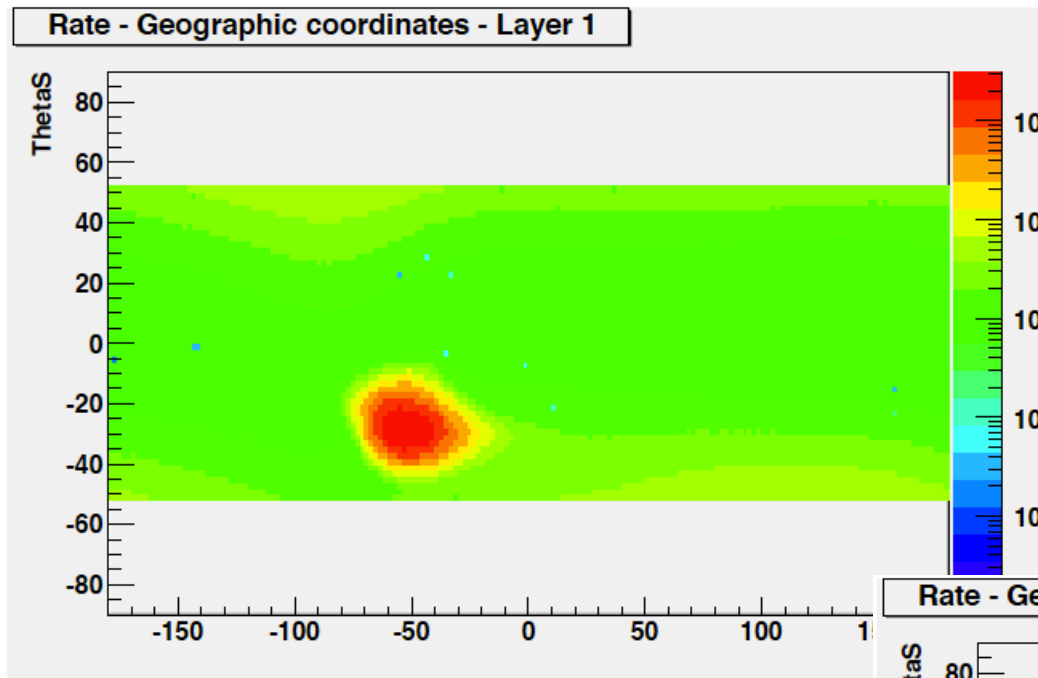
Hit counter definition

A “hit” counter is defined as a counter with one off-time Low Threshold on both sides in a time coincidence of about 20 ns.



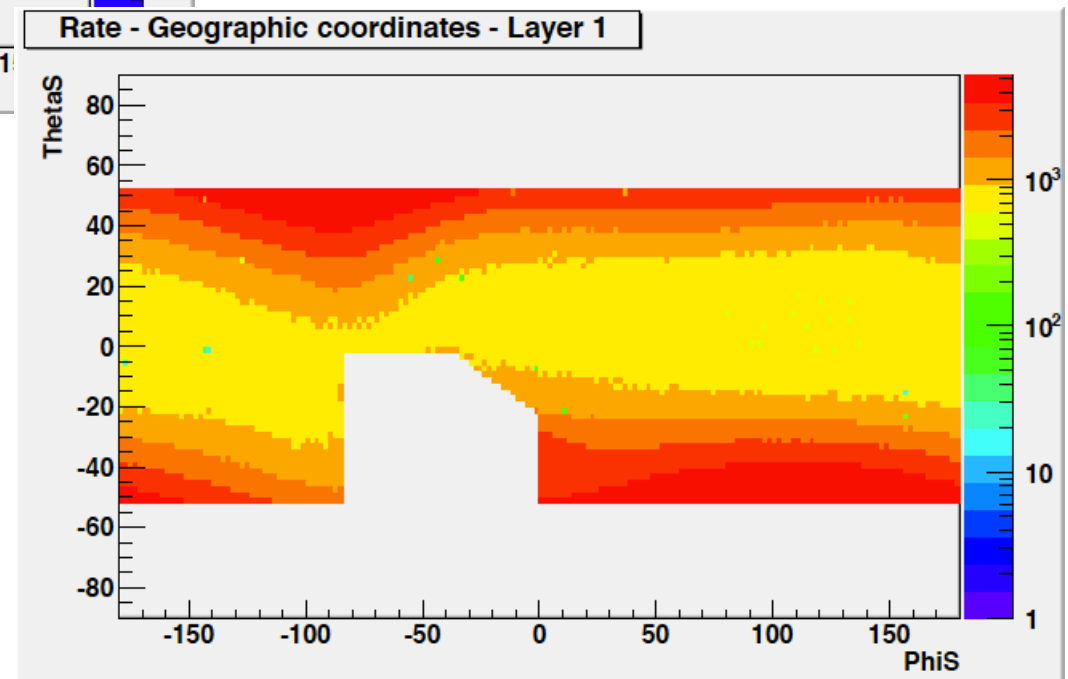
Layer 1 particle rate

At least one counter hit in layer 1



The Layer 1 rate at the SAA is up to 300 kHz (saturated).

The Layer 1 rate near magnetic poles is larger than 5 kHz.

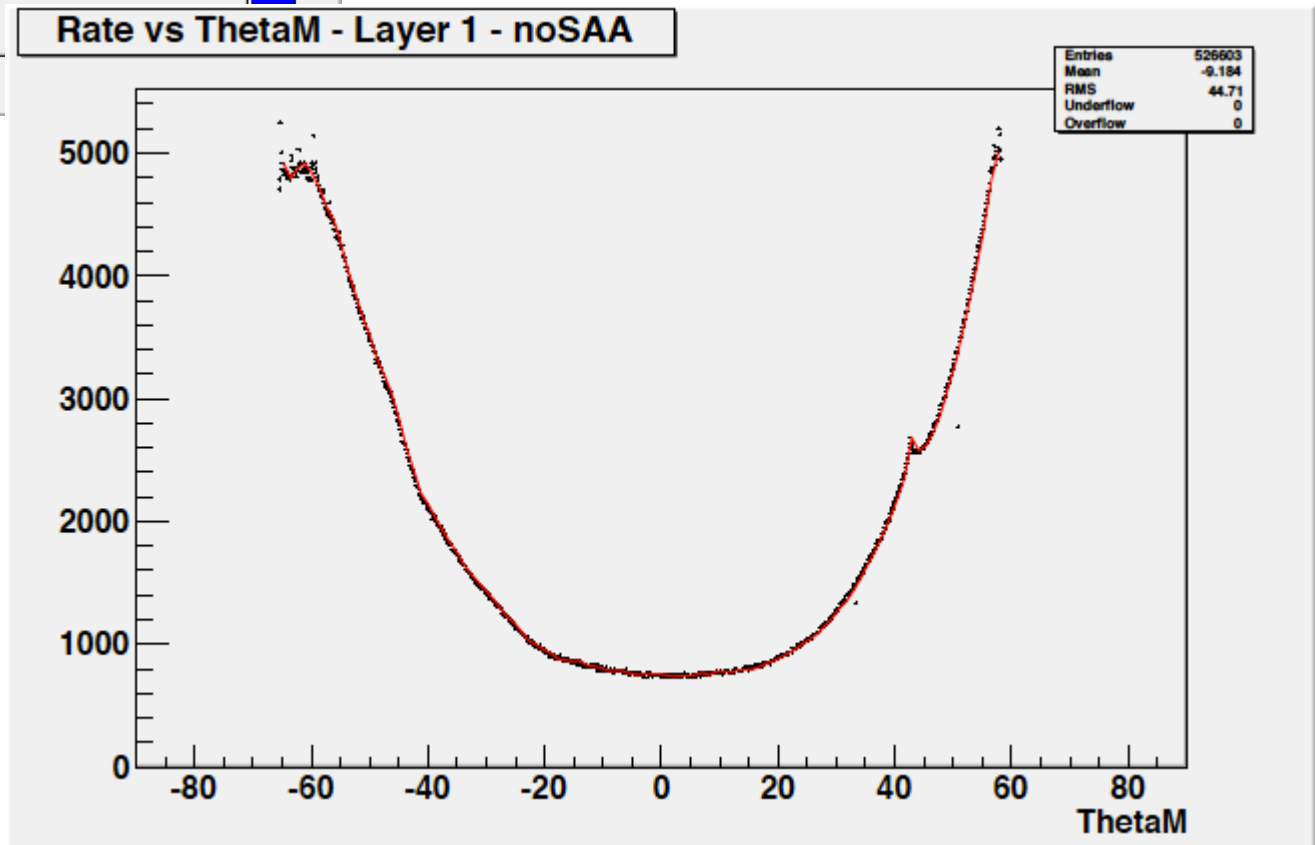
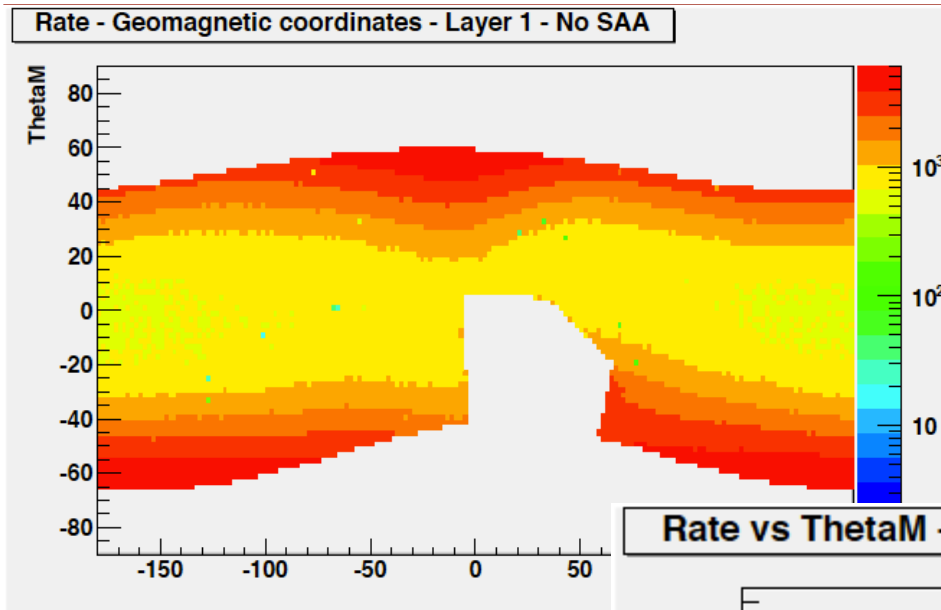


Principle of the measurement



1. Measure the average rate as a function of Geomagnetic Latitude (excluding SAA)
2. From the known value of Geomagnetic Latitude as a function of time, derive the expected average rate as a function of time
3. Compare the expected rate with the actual rate

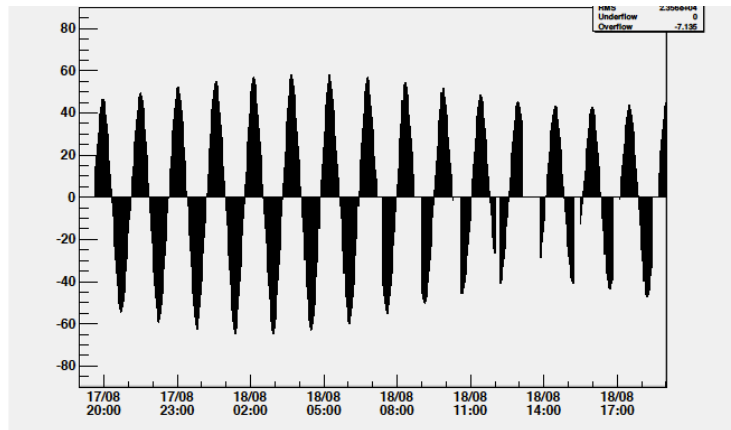
Average rate as a function of Geomagnetic Latitude



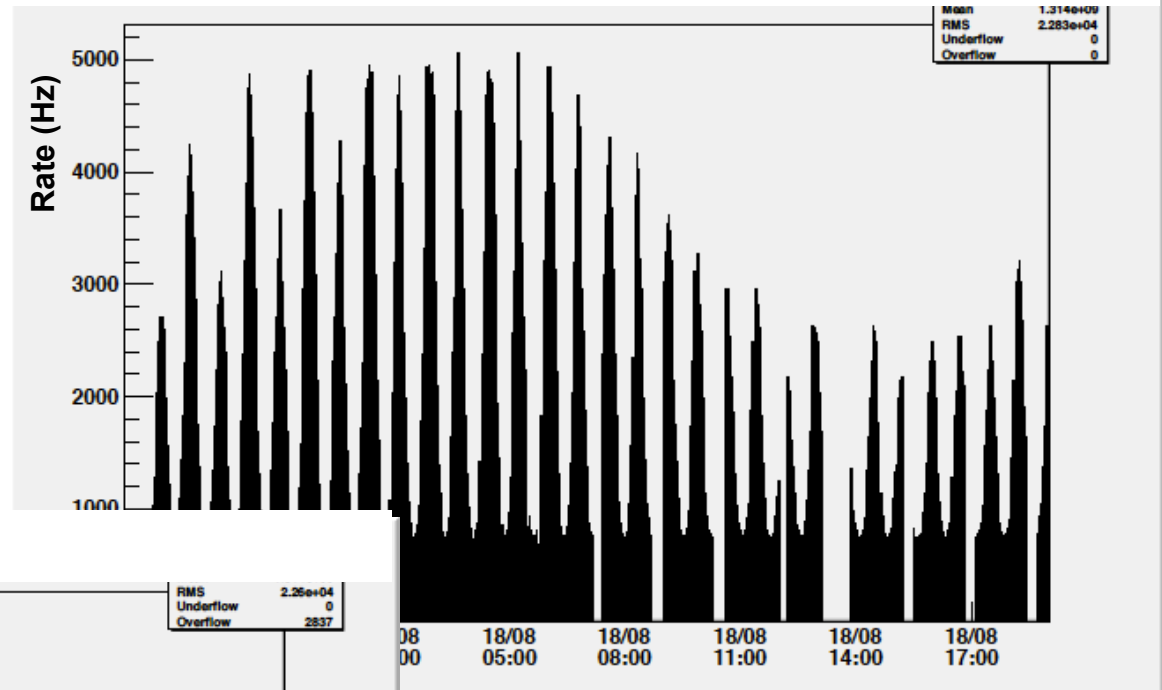
Expected rate vs. time (example: 1 day)



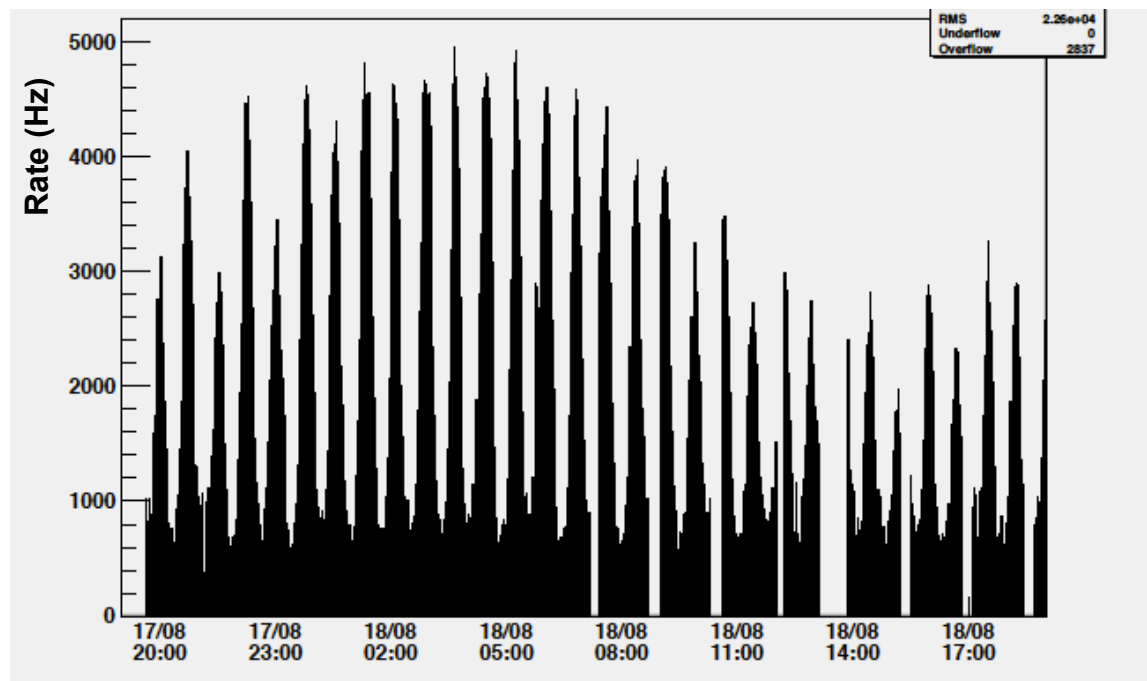
average magnetic latitude vs. time



expected rate vs. time



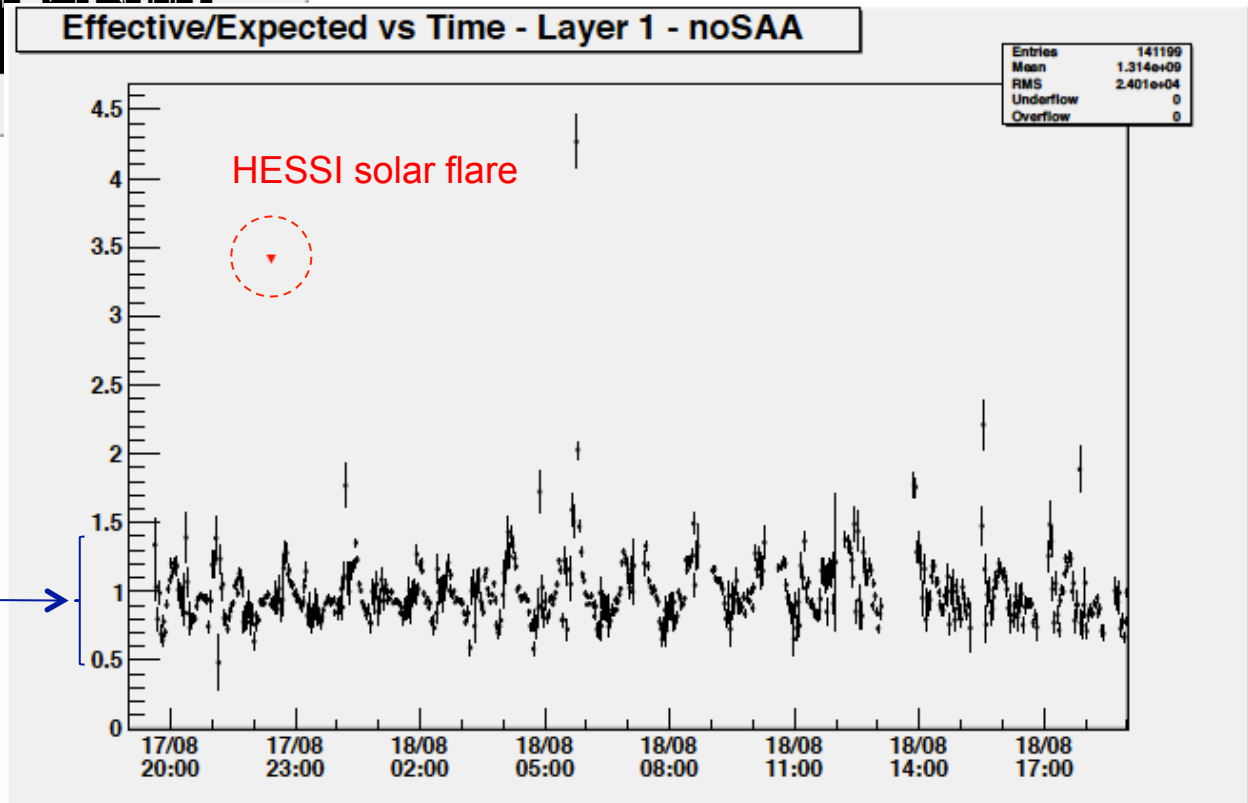
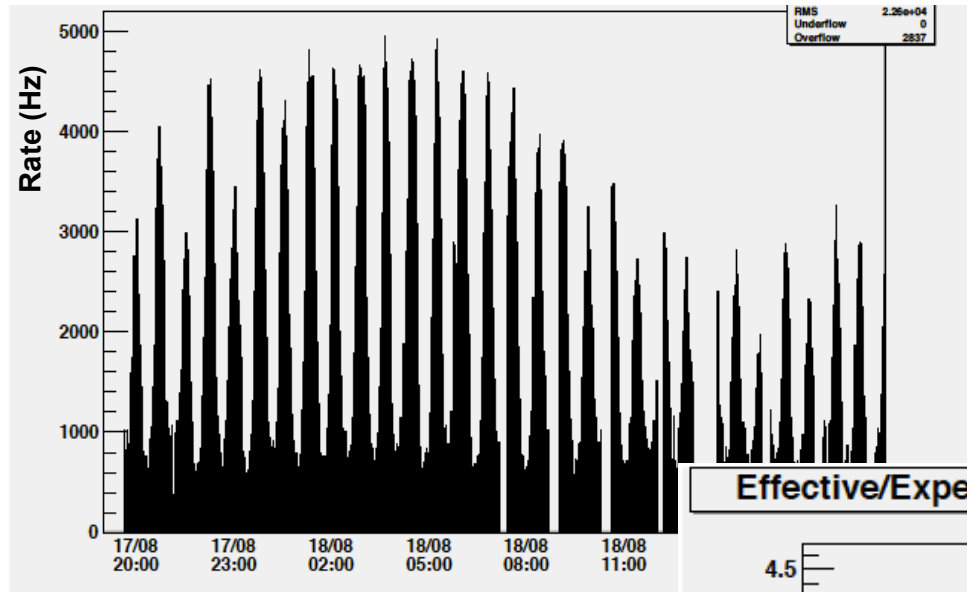
effective rate vs. time



Effective rate vs. time (example: 1 day)

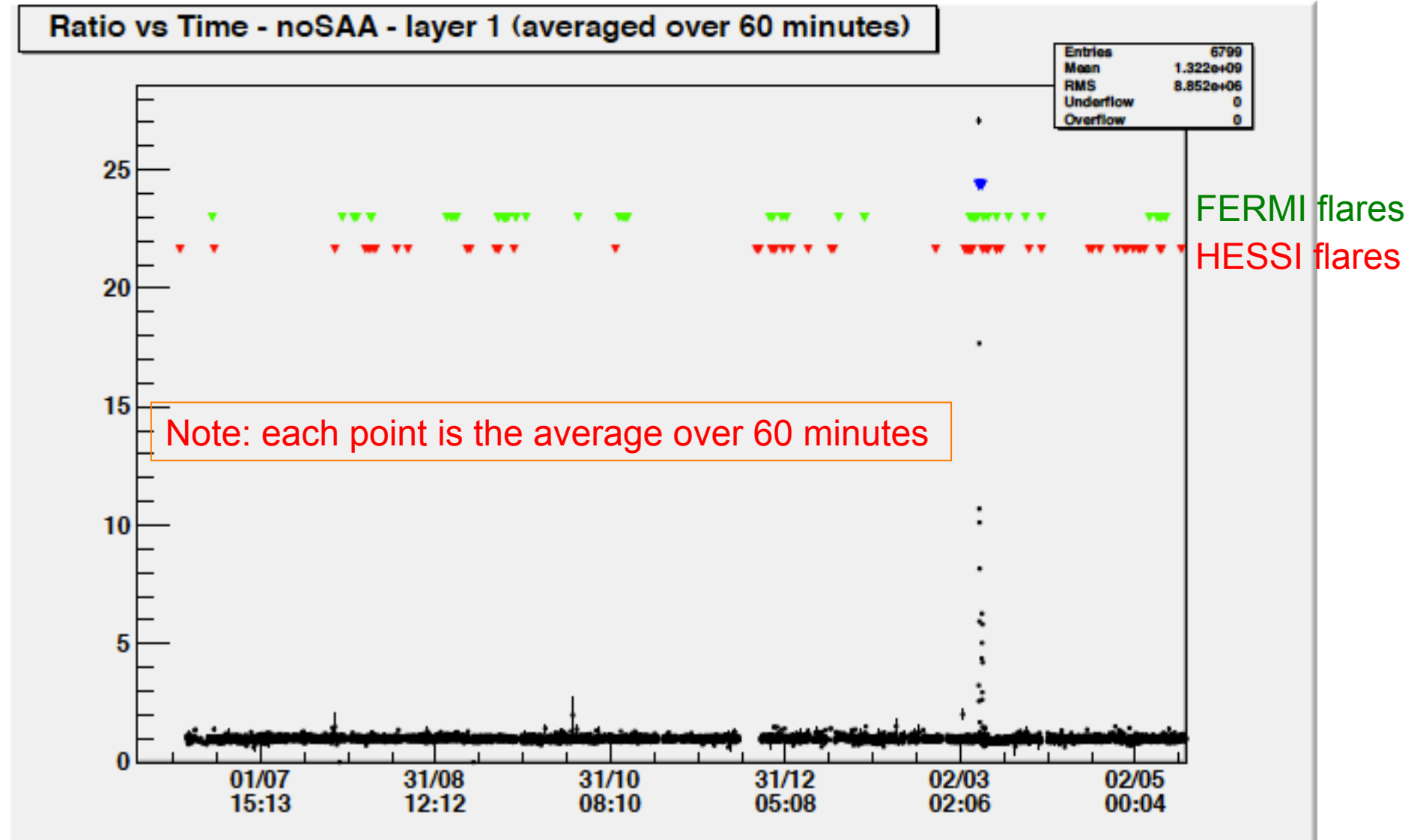


effective rate vs. time



Residual effect due to the binning of the average rate as a function of geomagnetic latitude histogram

Effective/Expected rate vs. time

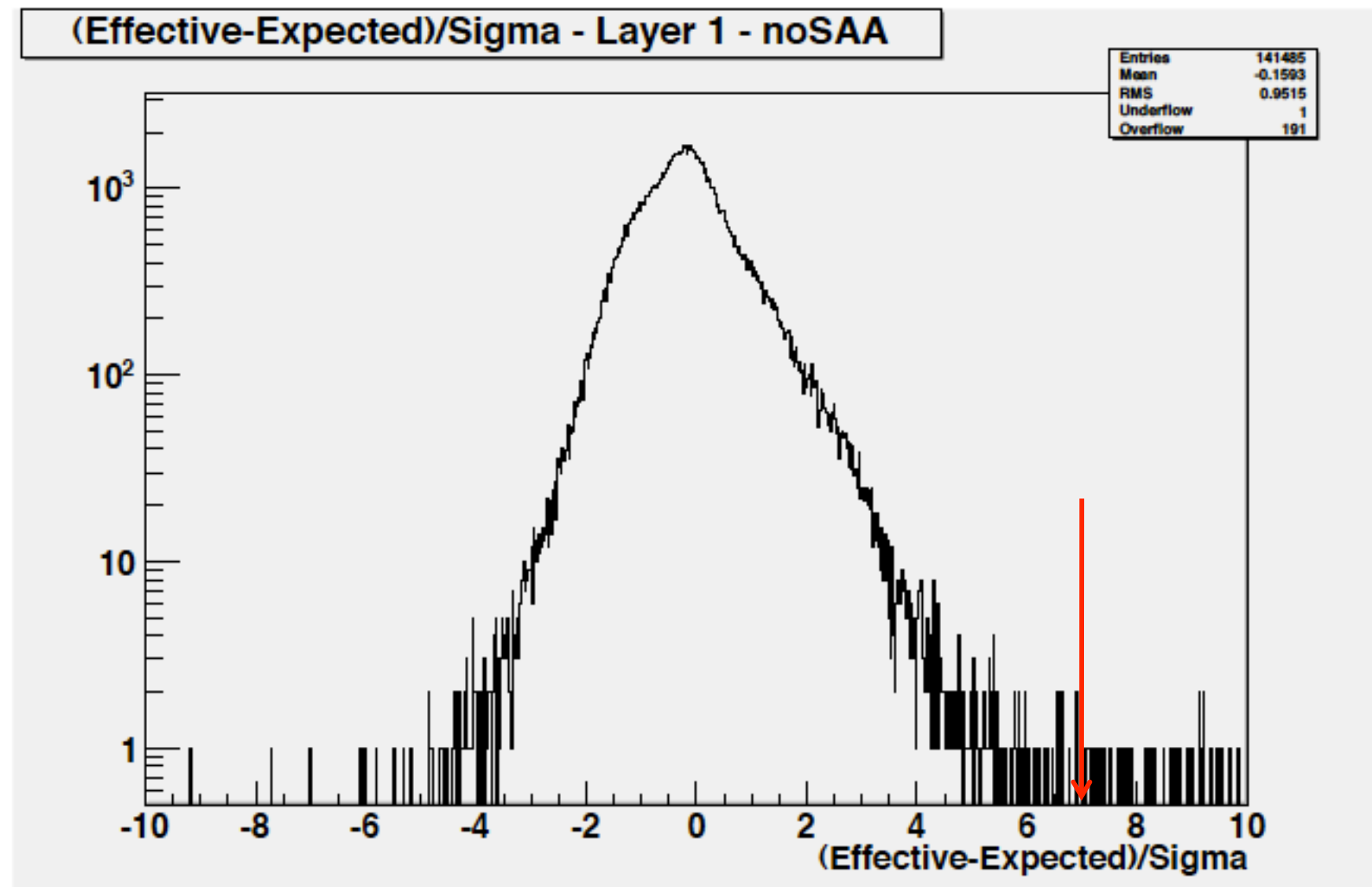


FERMI flares: http://hesperia.gsfc.nasa.gov/fermi/gbm/qlook/fermi_gbm_flare_list.txt (peak>2000)

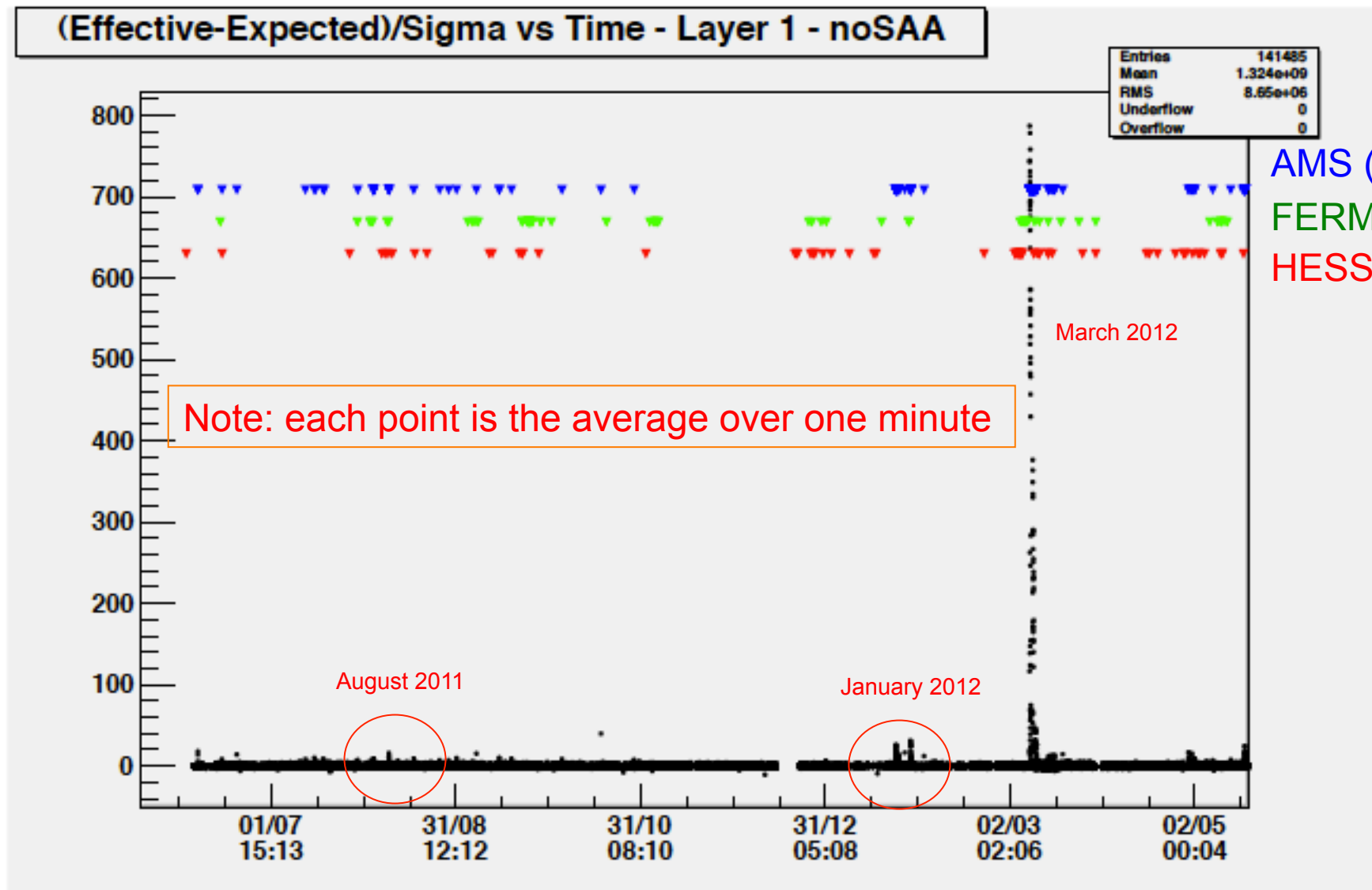
HESSI flares: http://hesperia.gsfc.nasa.gov/hessidata/dbase/hessi_gbm_flare_list.txt (peak>100000)

A. Contin, TOF absolute rate, 18/10/2012

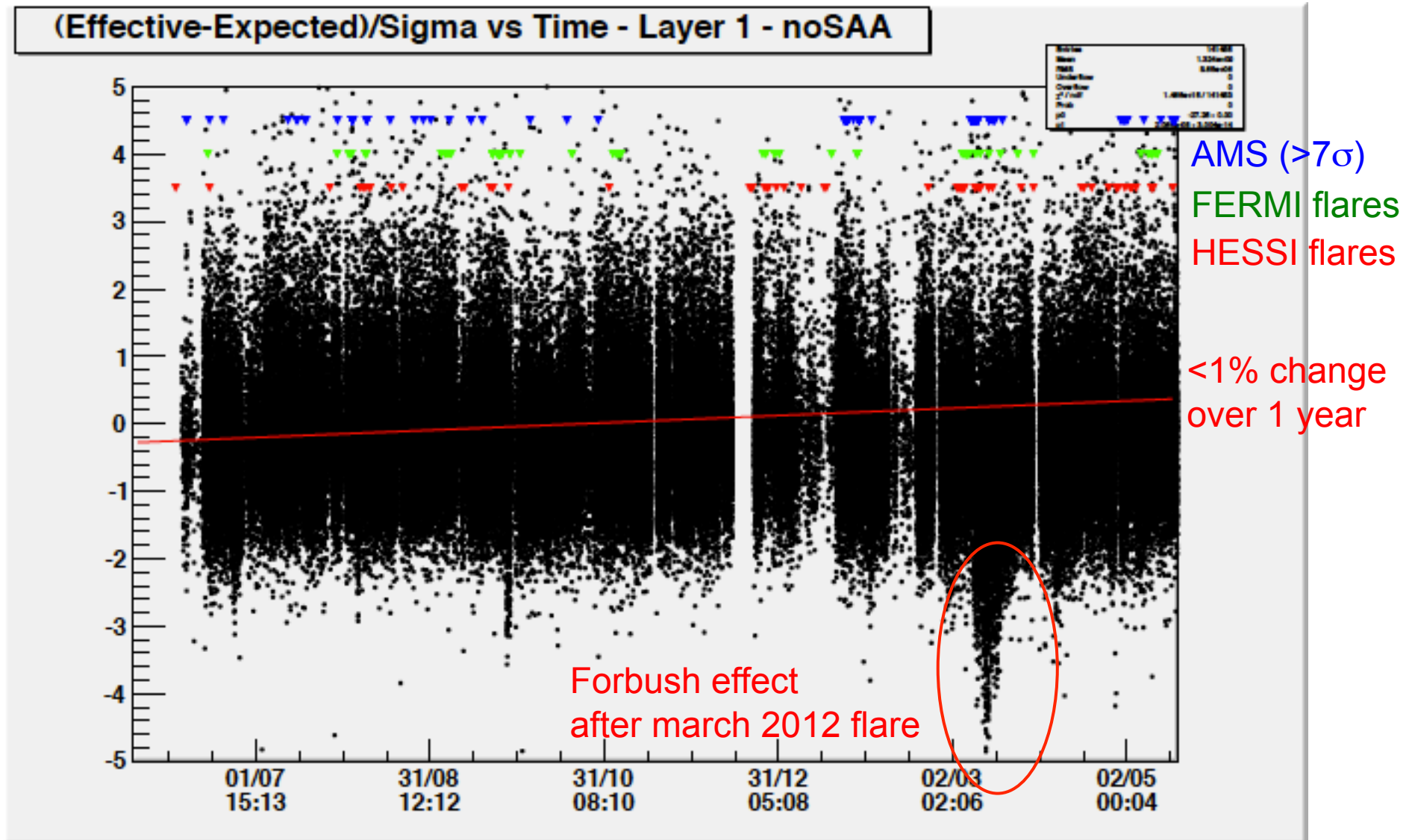
$(\text{Effective} - \text{Expected rate}) / (\text{standard deviation})$



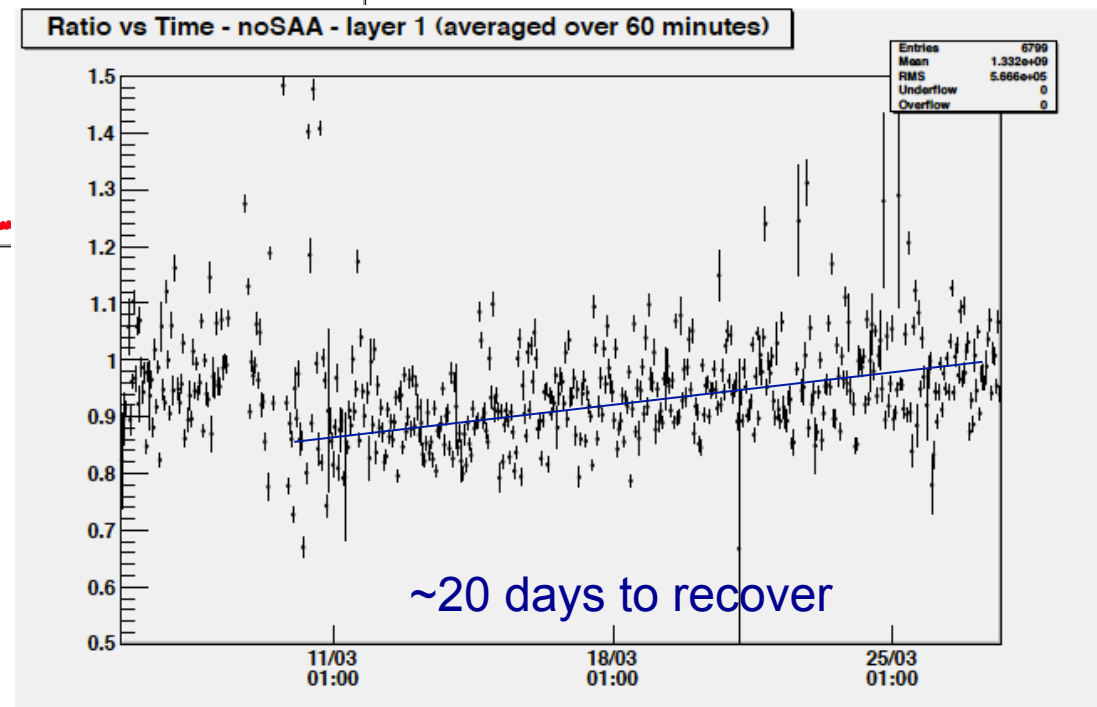
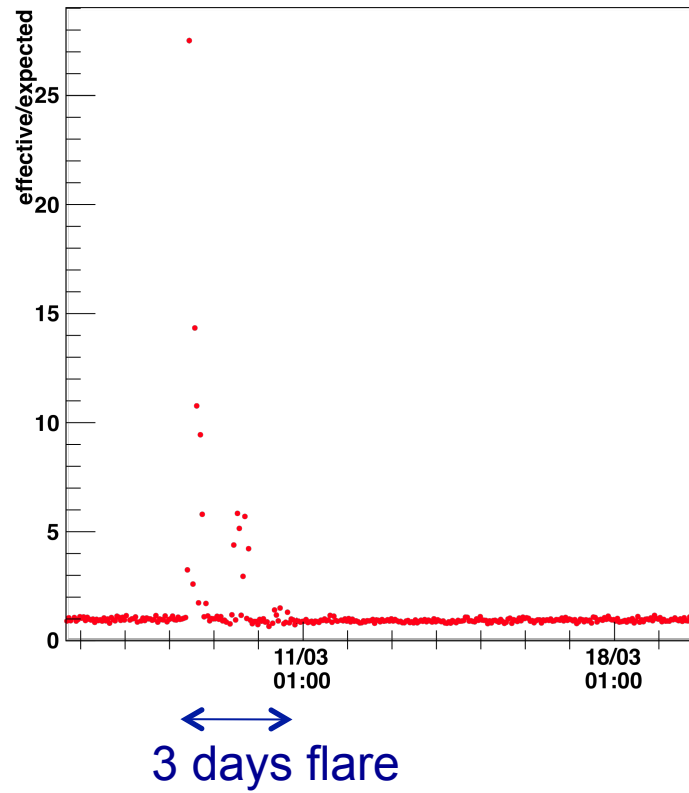
$(\text{Effective} - \text{Expected rate}) / (\text{standard deviation})$ vs. time



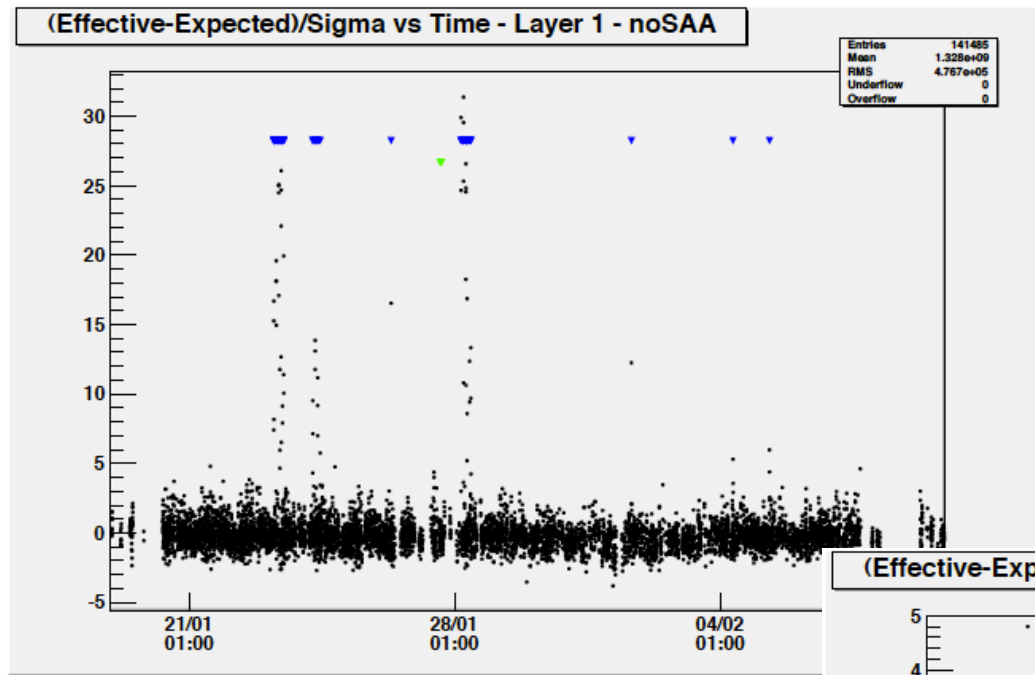
(Effective – Expected rate)/(standard deviation) vs. time



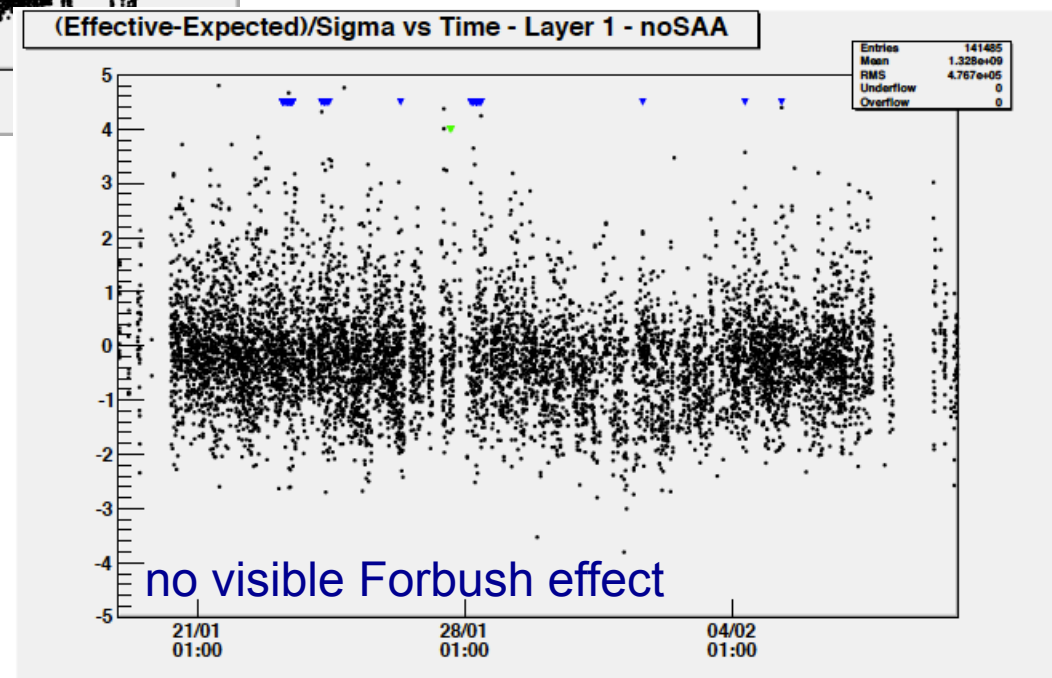
March 8, 2012 flare



January 23-28, 2012 flare

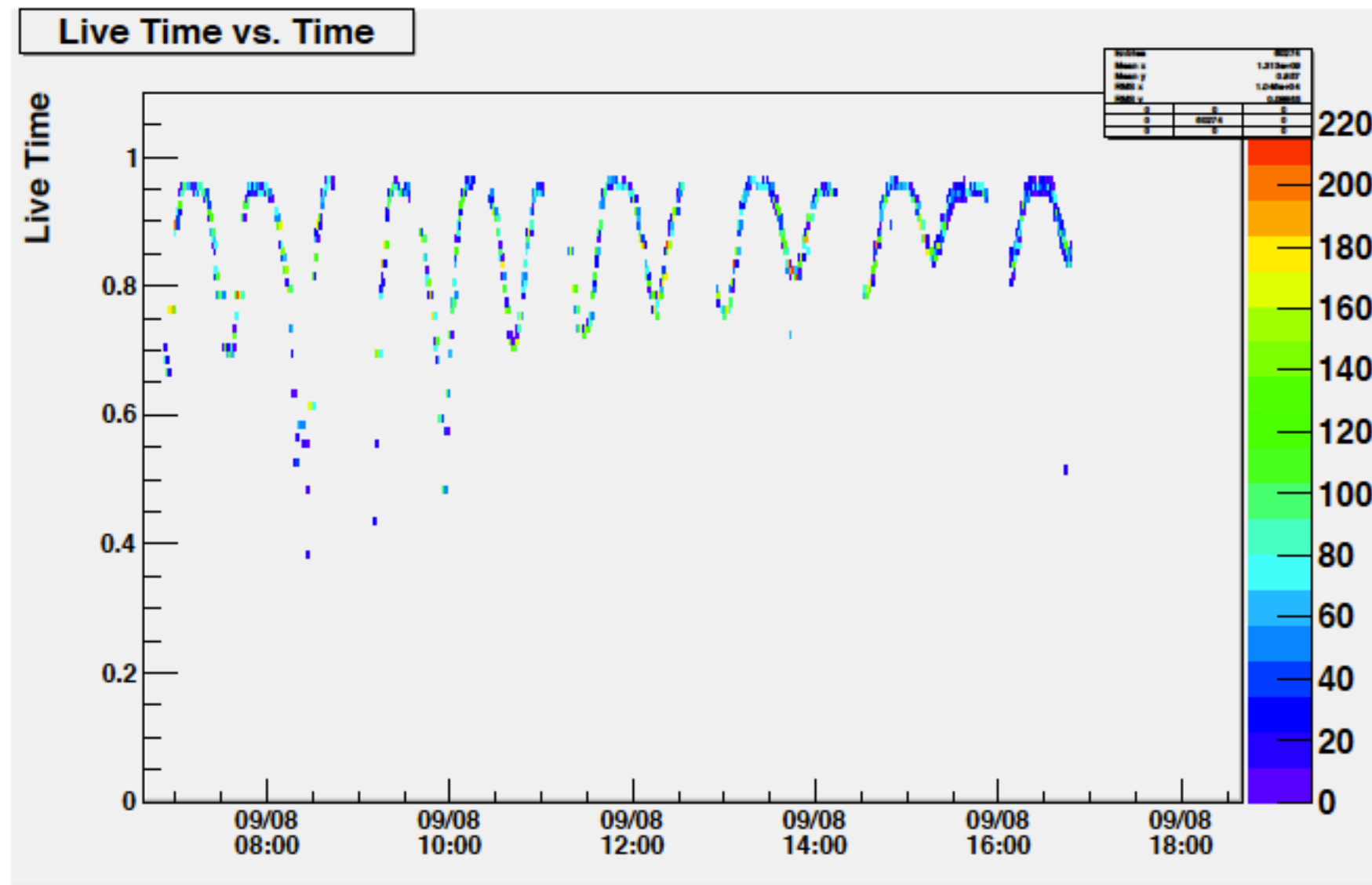


↔
2 days flare



1. Temporary decrease of the live time due to the higher rate
2. Temporary modifications in the heliosphere, and therefore of the east/west effect

Live time – August 9, 2011 flare



AMS TOF can measure the absolute rate on single counters or layers

AMS TOF can tag solar flares using the measurement of the absolute rate