

TLMs at Pbar

Progress since 7/19/11

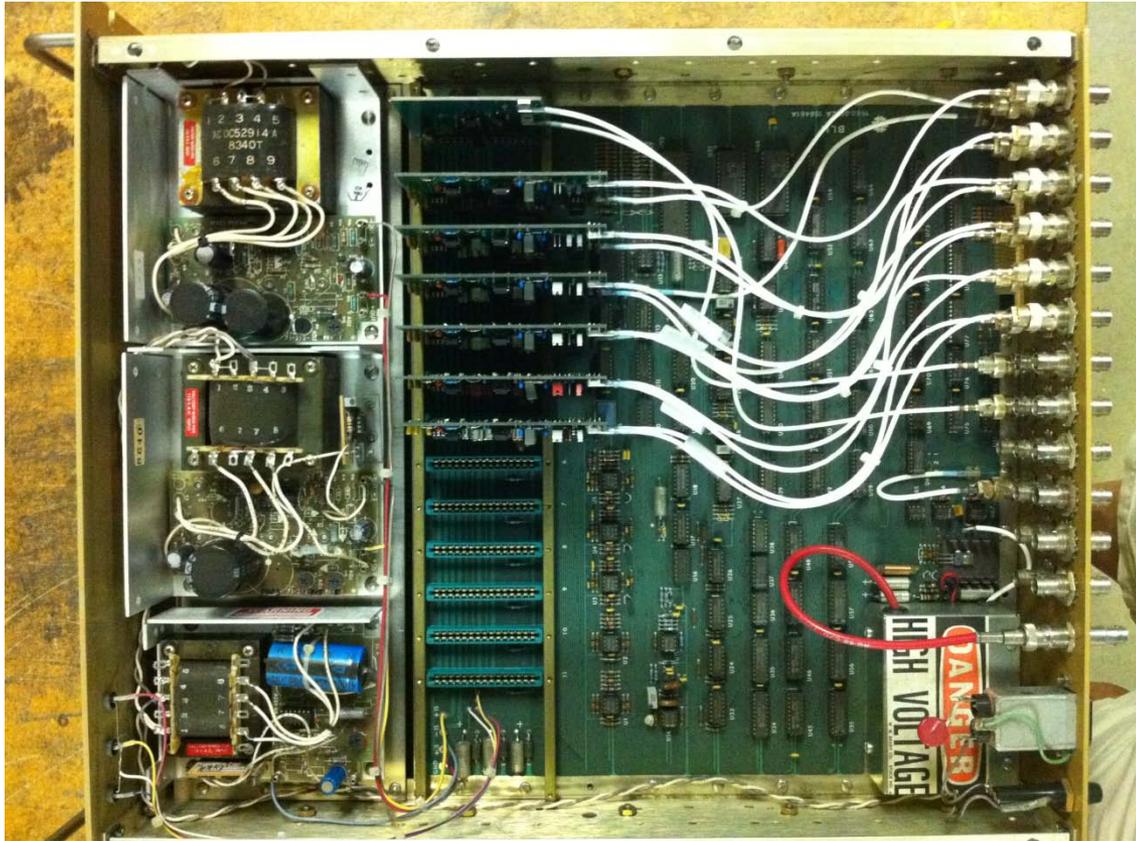
Meeting #3

August 25, 2011

TLMs History at Pbar

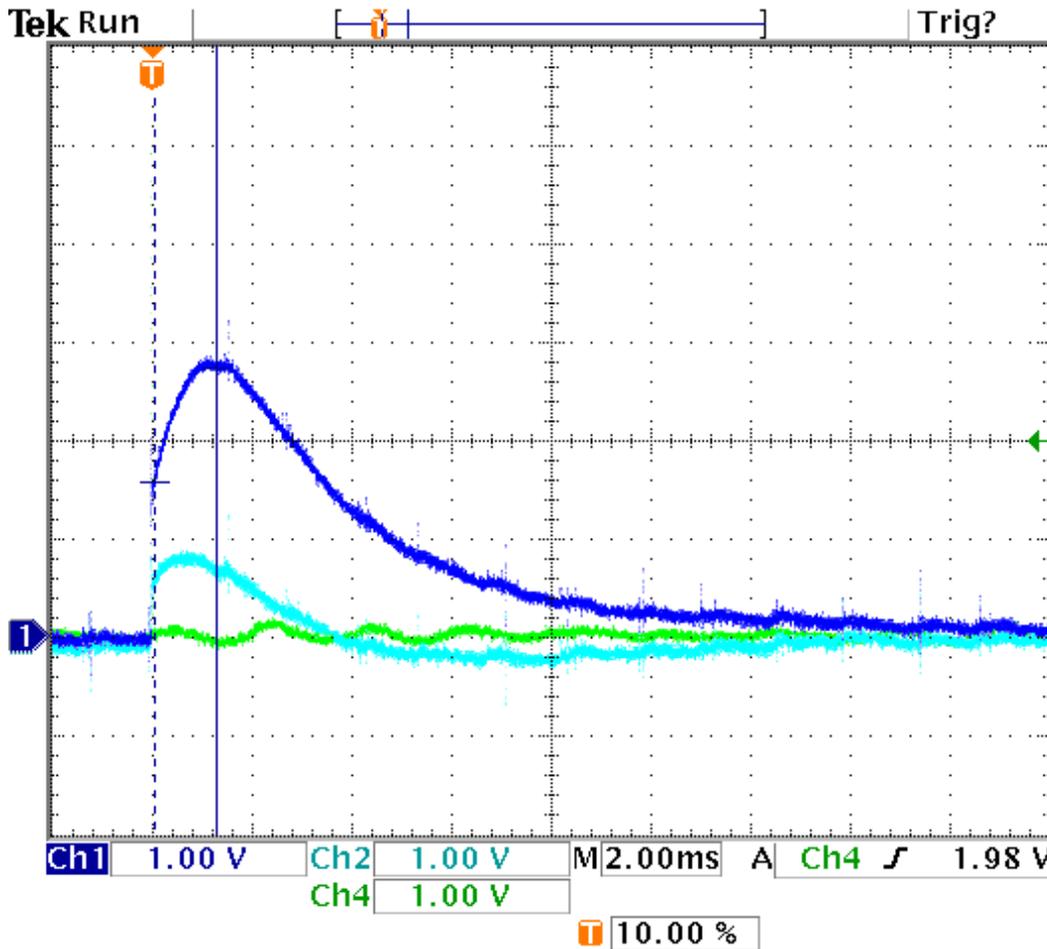
- 5/4 Director's review
- 6/16 first meeting
- 6/29 first 2 TLMs installed with 6 decade rate BLM cards
- 7/14 first signal
- 7/19 – second meeting
- 7/19 – first integration cards installed
- 8/18 - Chipmunk digitizer circuit installed (Blue box)
- 8/25 – third meeting

Since the last meeting



Current BLM chassis contains:
6 decade log rate cards
0.014 RADS
0.14 RADS
1.4 RADS
14 RADS

Scope pictures



Δ: 1.16 V
@: 2.72 V
Δ: 1.24ms
@: 1.28ms

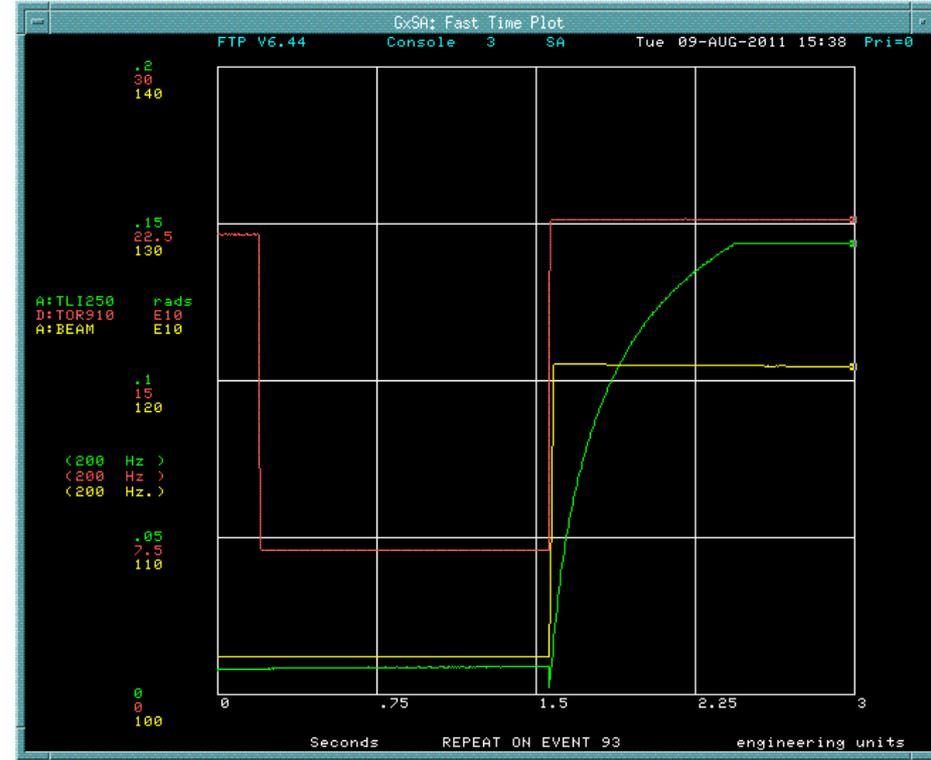
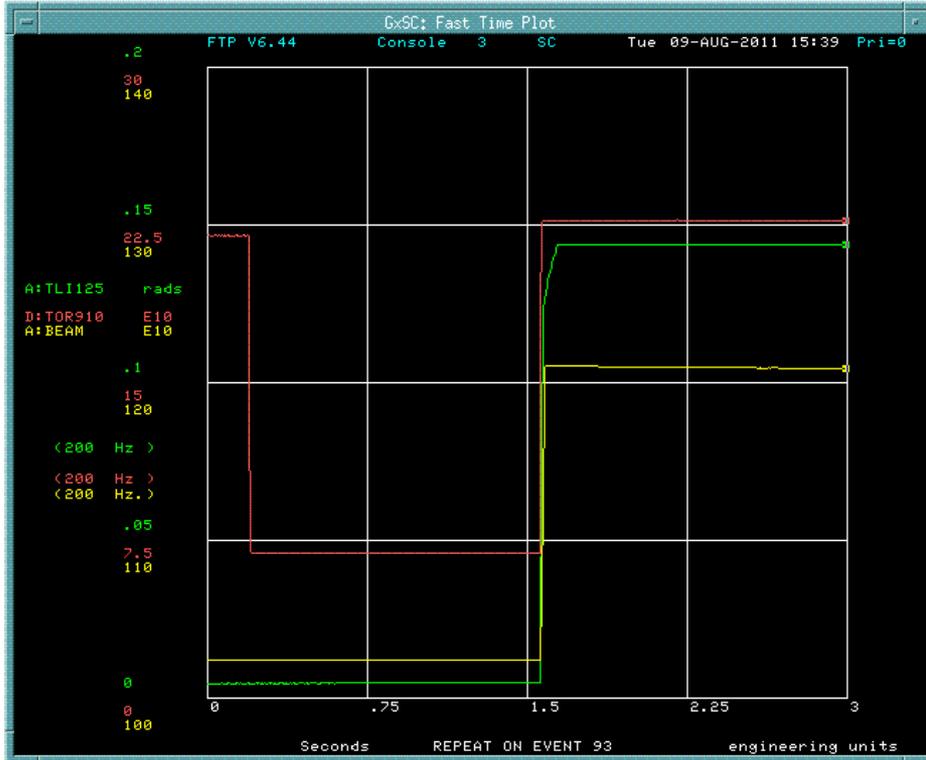
Ch1 Max 3.20 V 125 foot response

Ch2 Max 1.24 V 250 response

50 Booster bunches
Partial scraping loss on elam

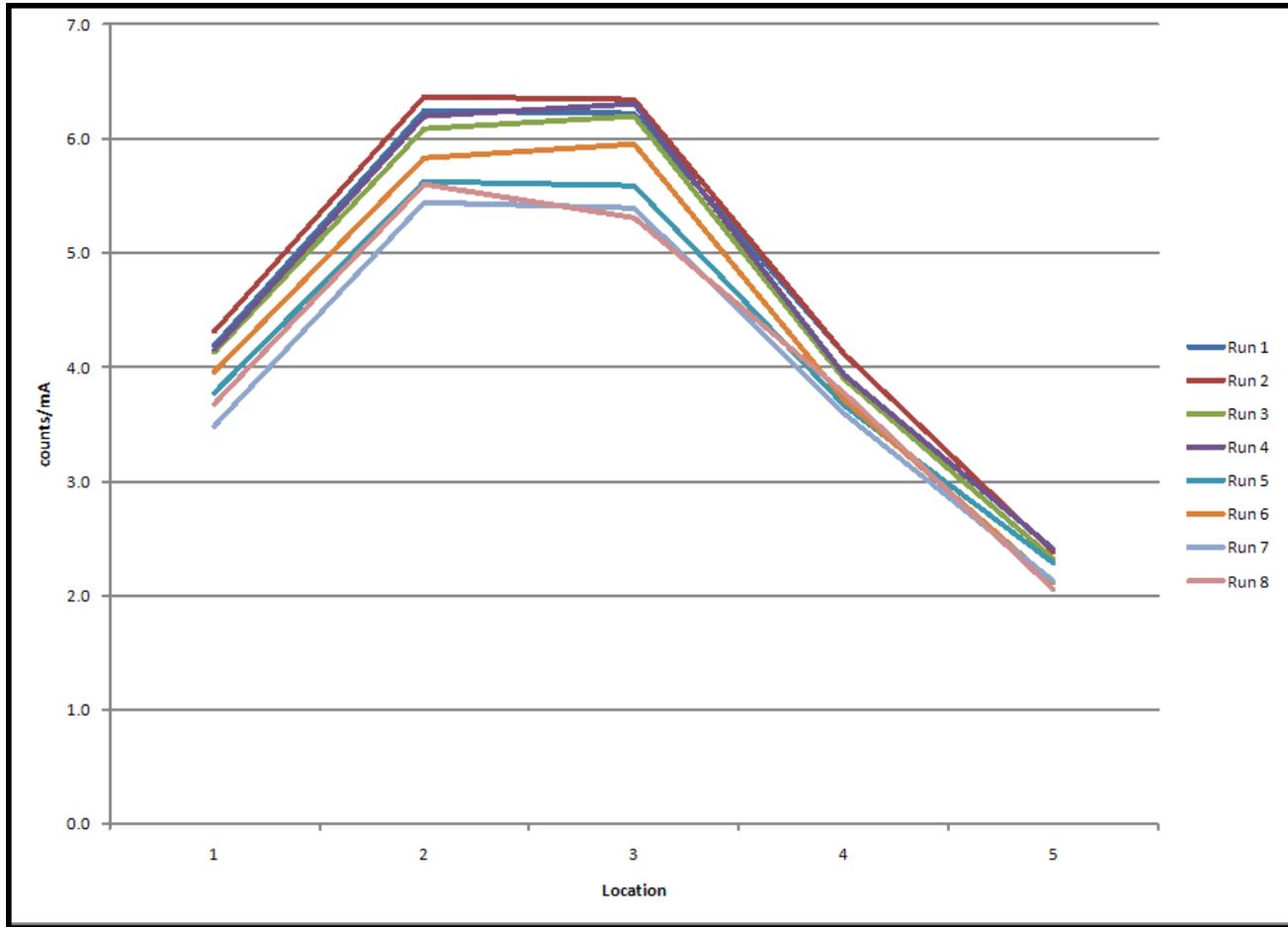
9 Aug 2011
14:38:26

0.14 RAD cards saturate



Partial scraping loss on ELAM
50 Booster bunches
D:HT906A + 10A

Repeated 2000 Pbar SA measurement

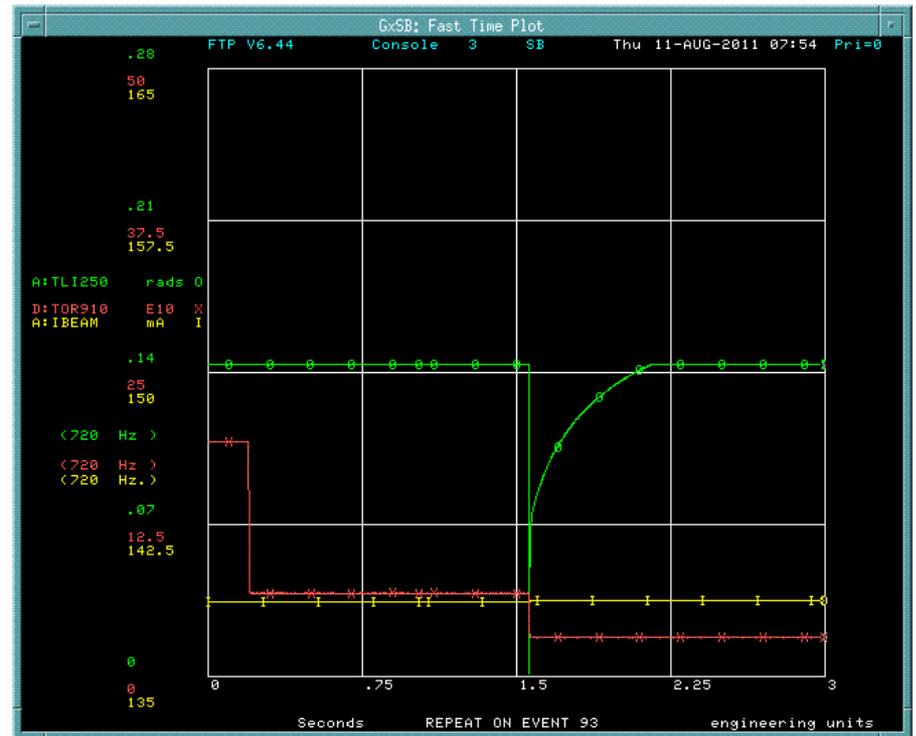
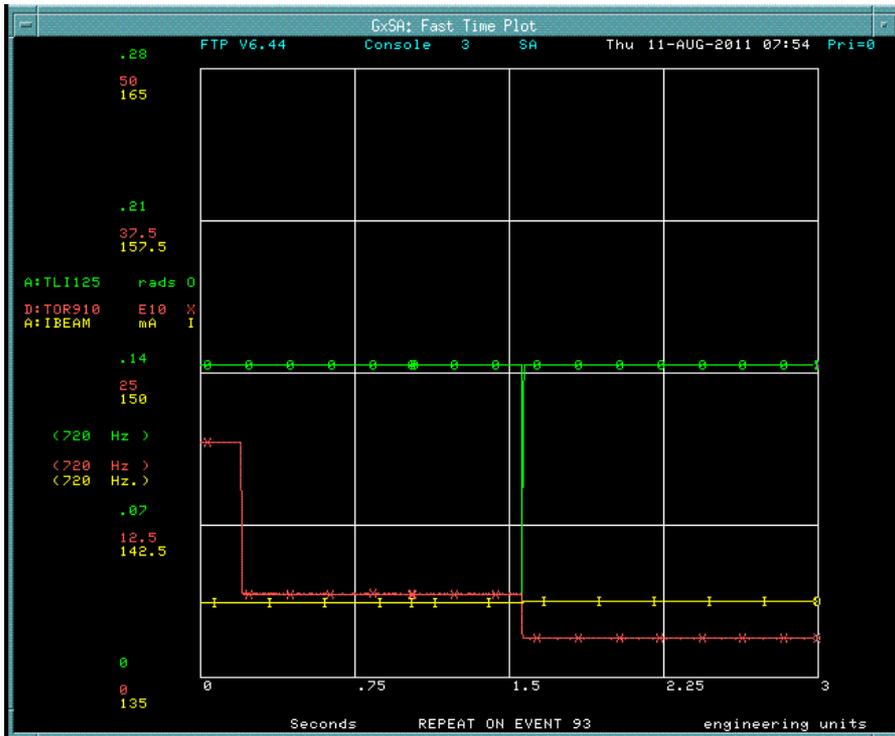


Counts per mA lost

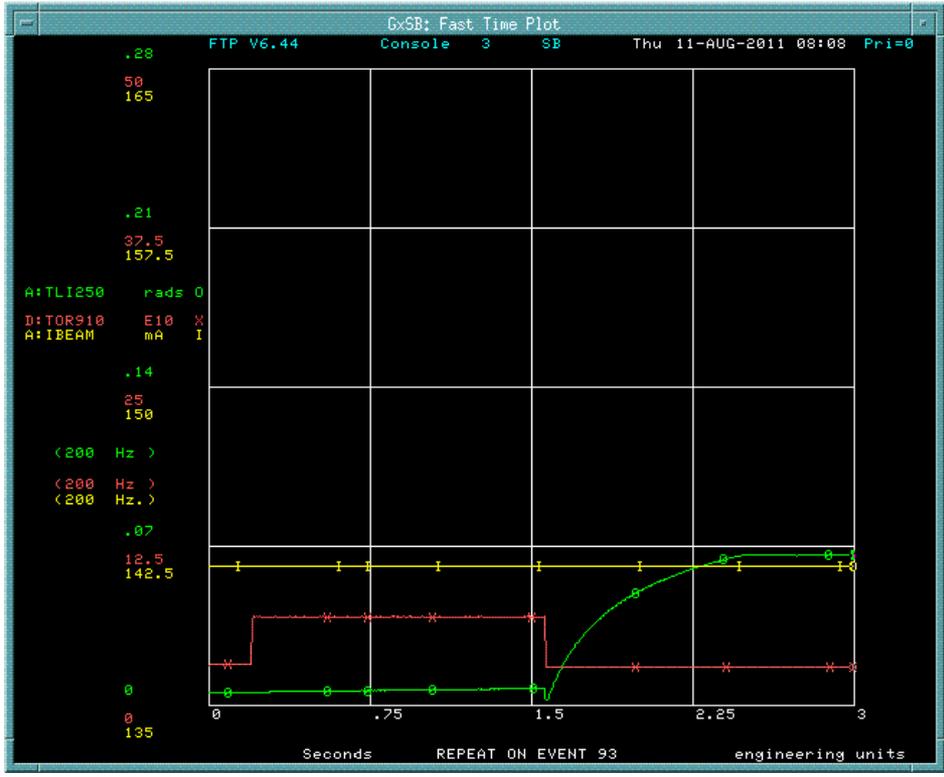
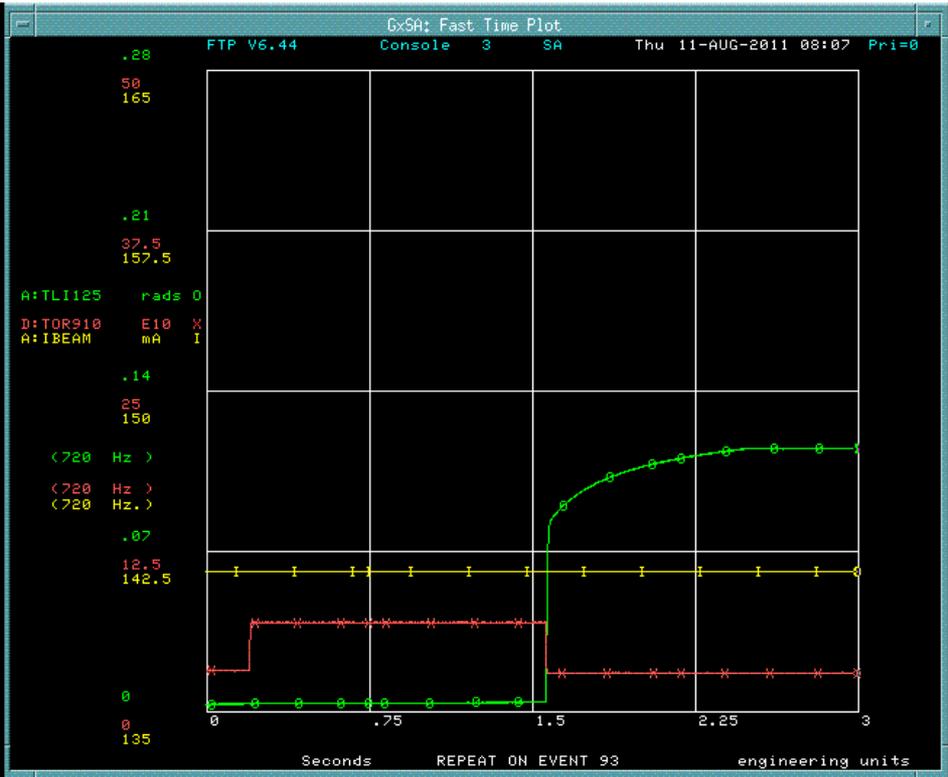
Expected these curves to be consistent

Demonstrates that scraping loss is unreliable technique to establish response

Single resets do not clear BLM cards in all cases

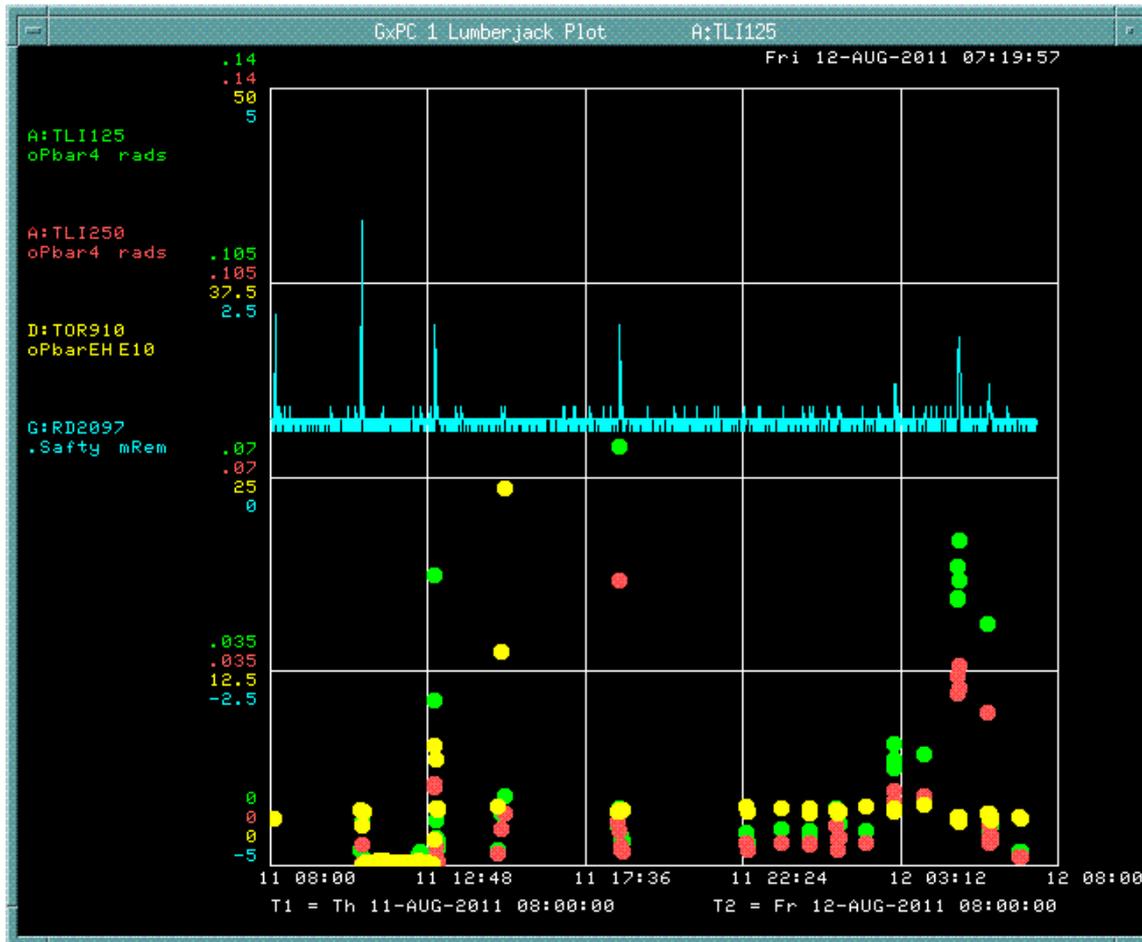


Clear on 00 event and 93 event



Used reset at beginning of transfer timeline to clear integrator

TLMs samples on 93 reverse proton tuneup event



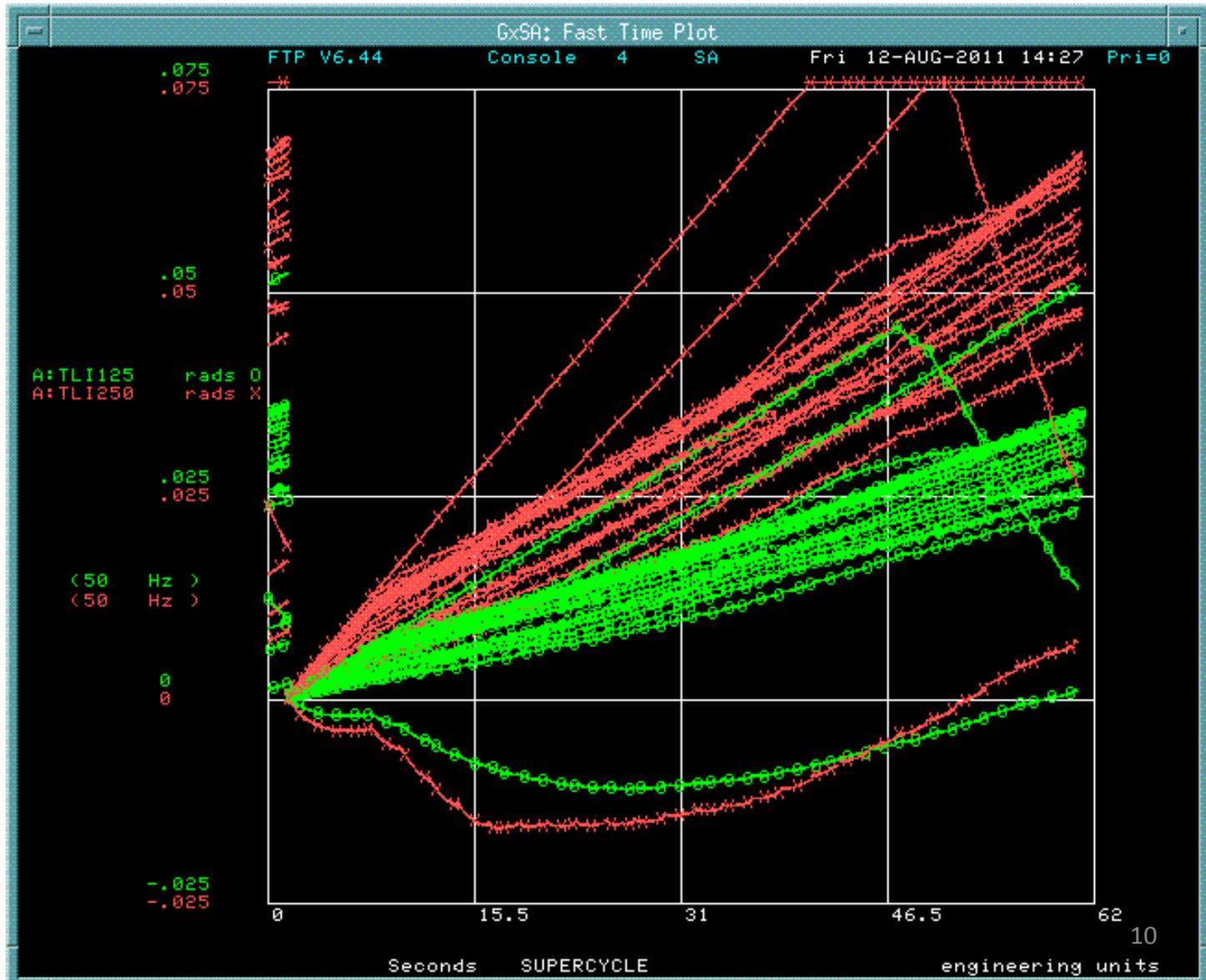
Transfers over 24 h period

TLM response coincident with chipmunk response outside of shielding

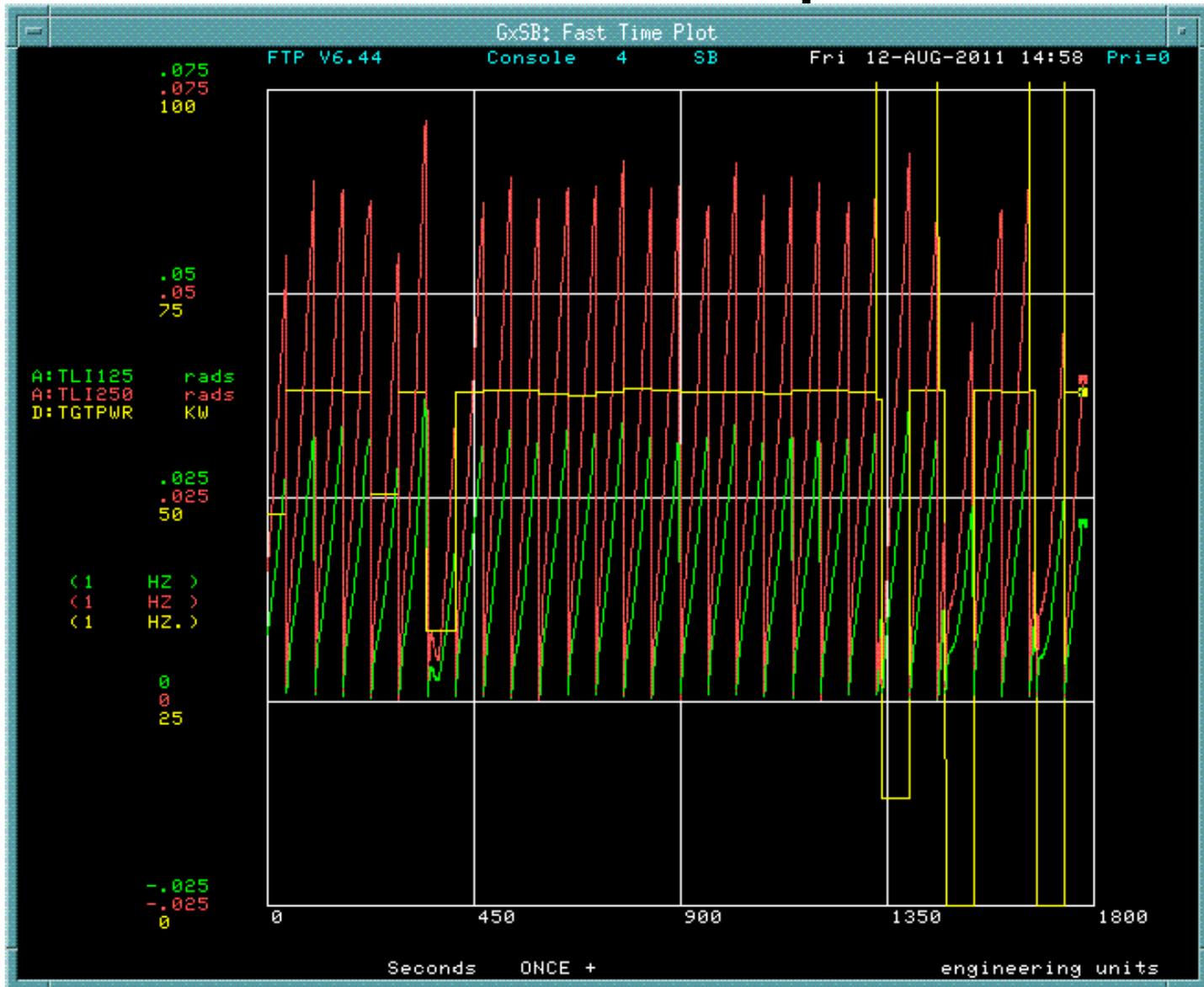
Small negative currents occur

e.g. when
beam goes away

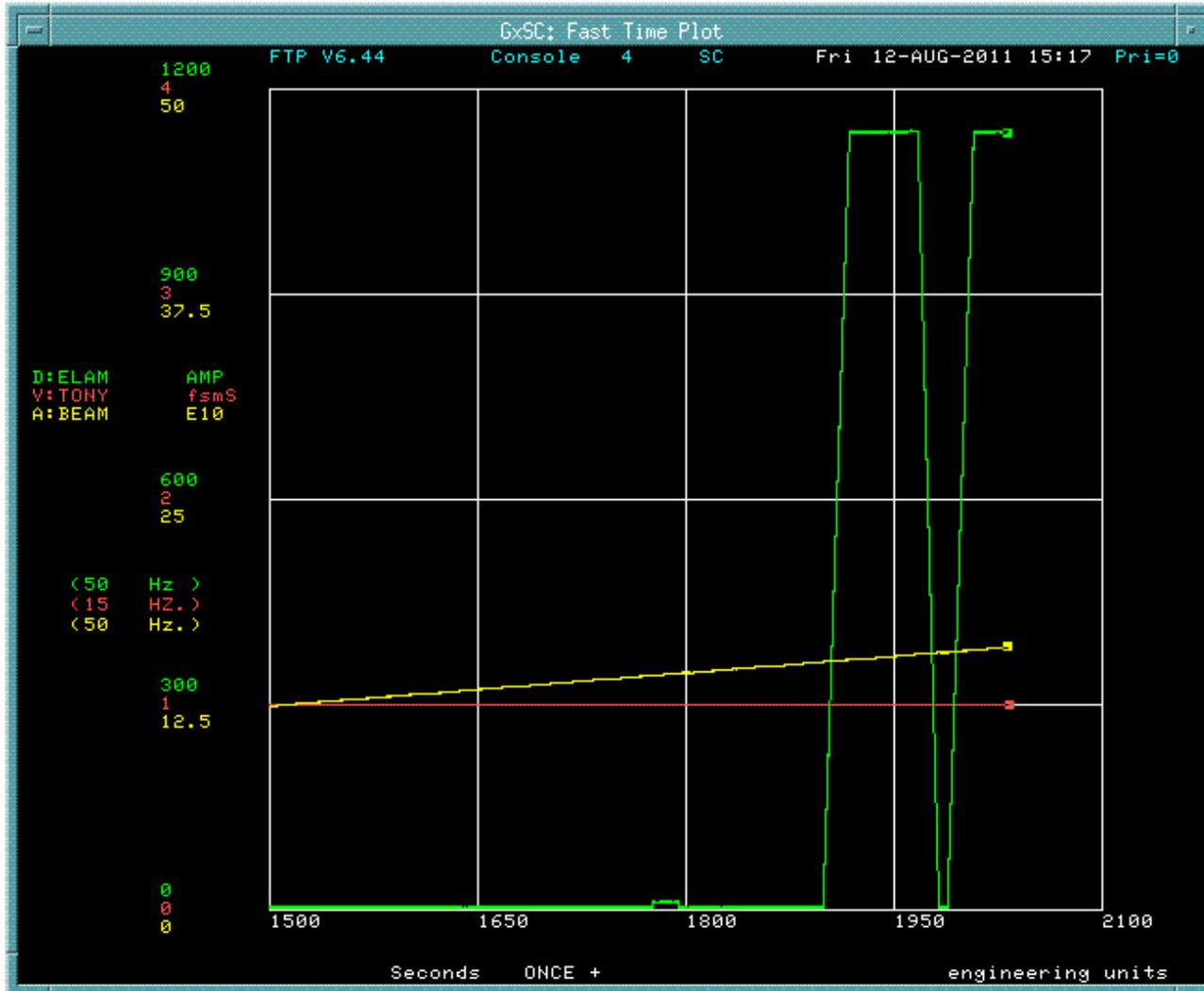
Chipmunks
have Cs-137
source to
drive
current



Some minutes of operation

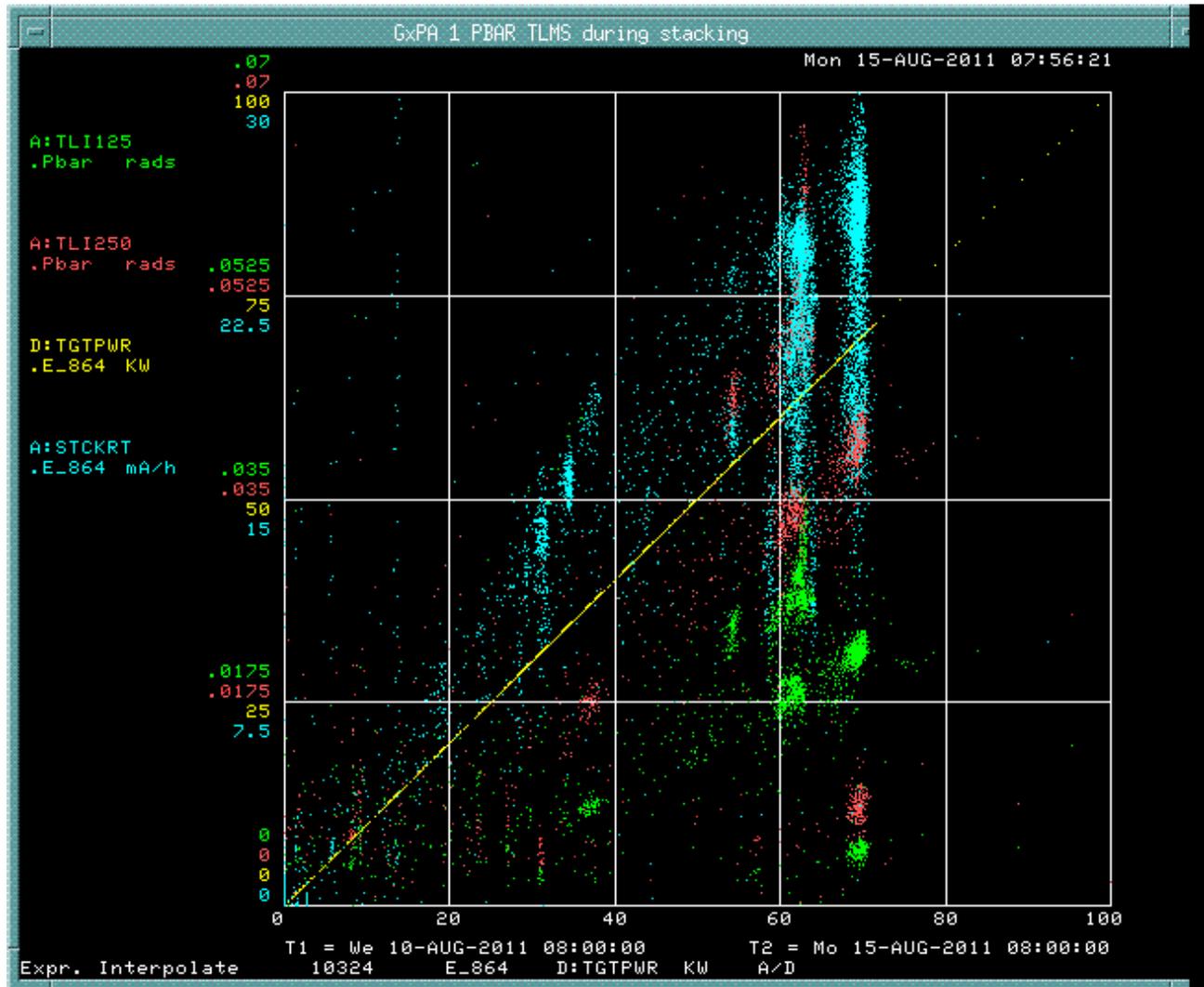


Script has been written to ramp elam simplifies beam loss studies

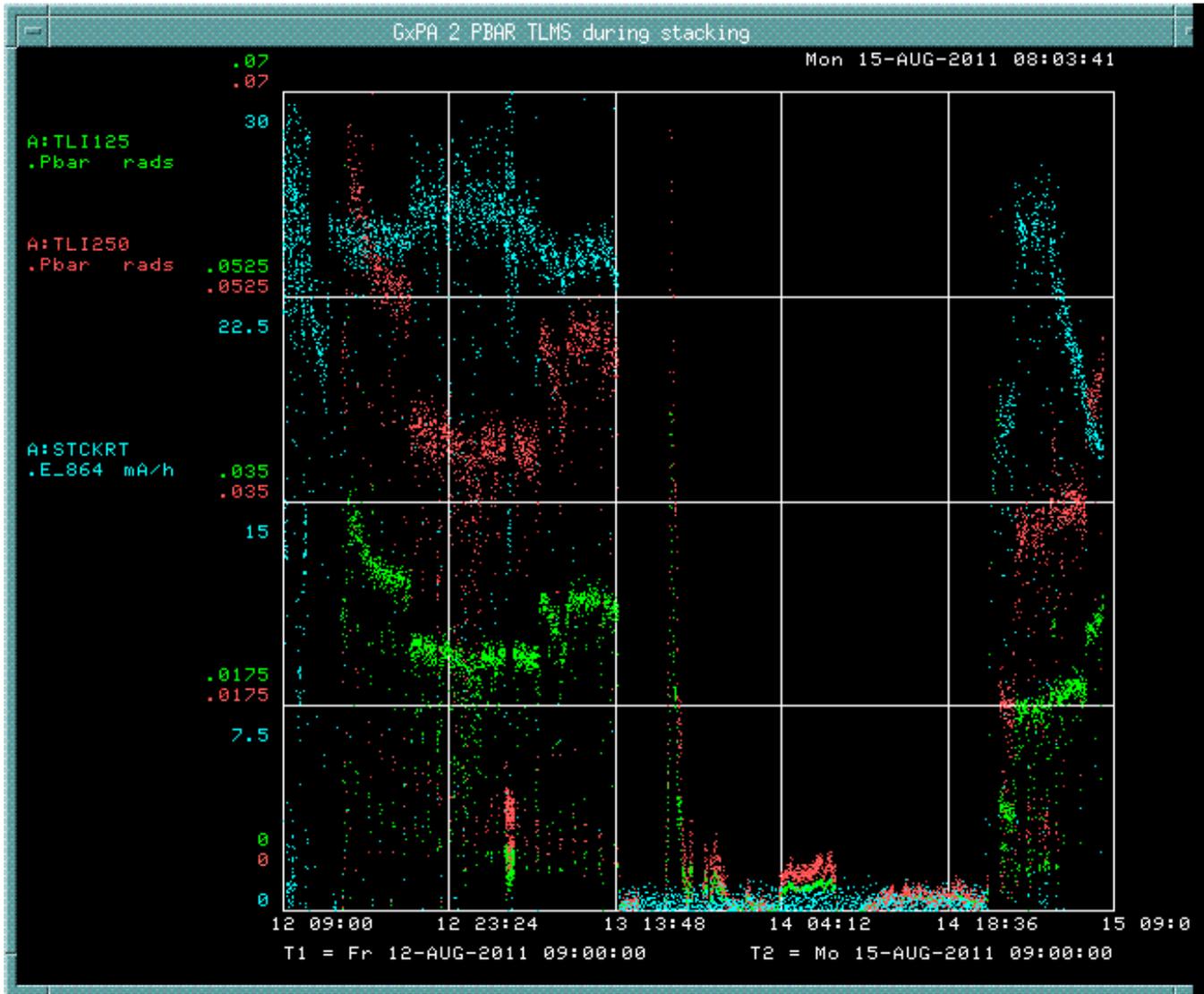


Script by DVM

TLM response correlated with beam power on target by timeline variation



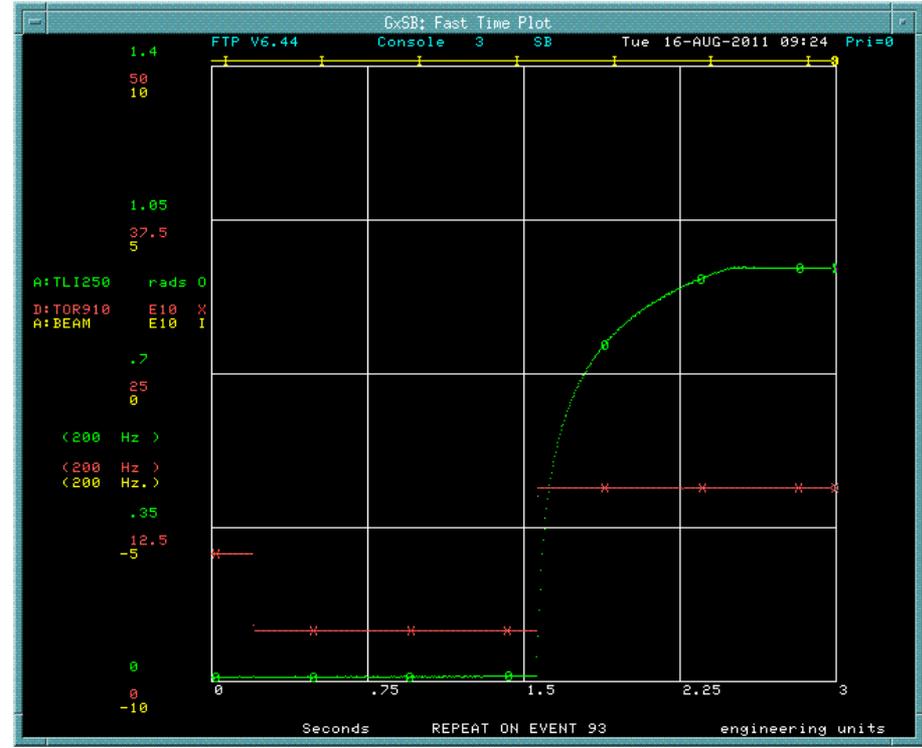
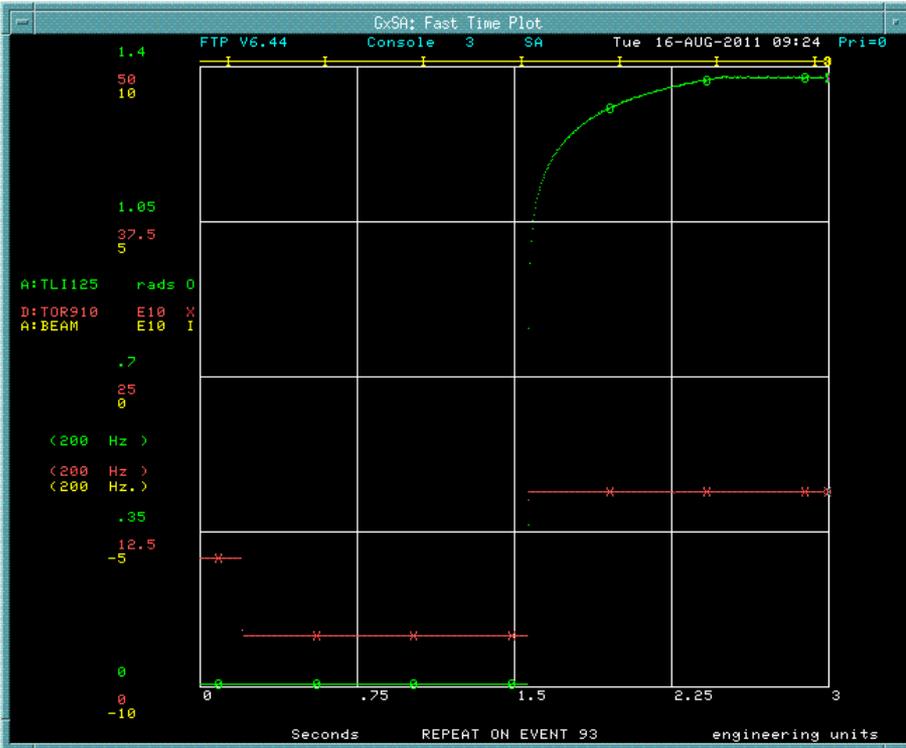
TLM response correlated with stacktail performance



TLM response to very subtle effects

Suggests good sensitivity

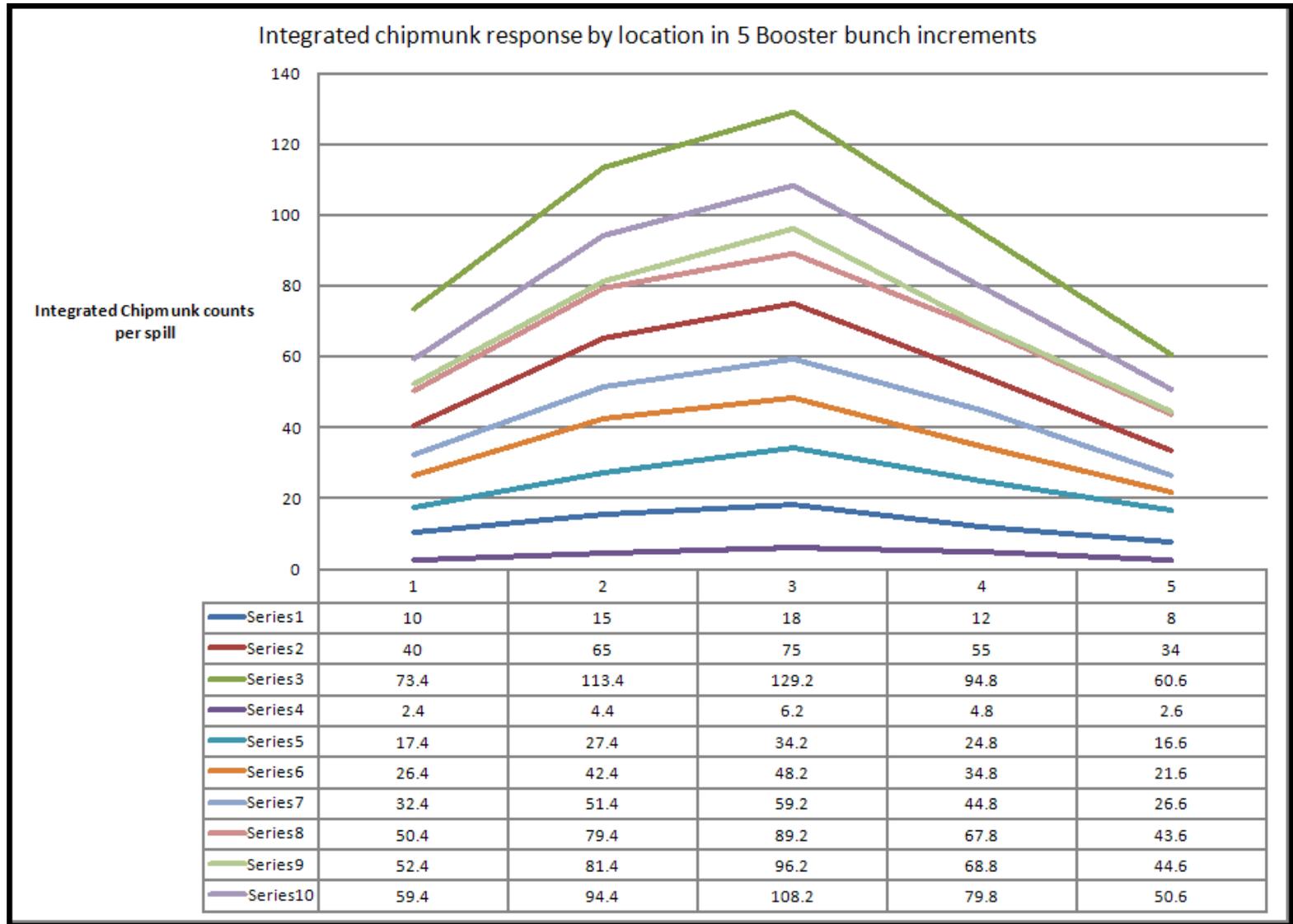
A series of measurements have been variable beam loss



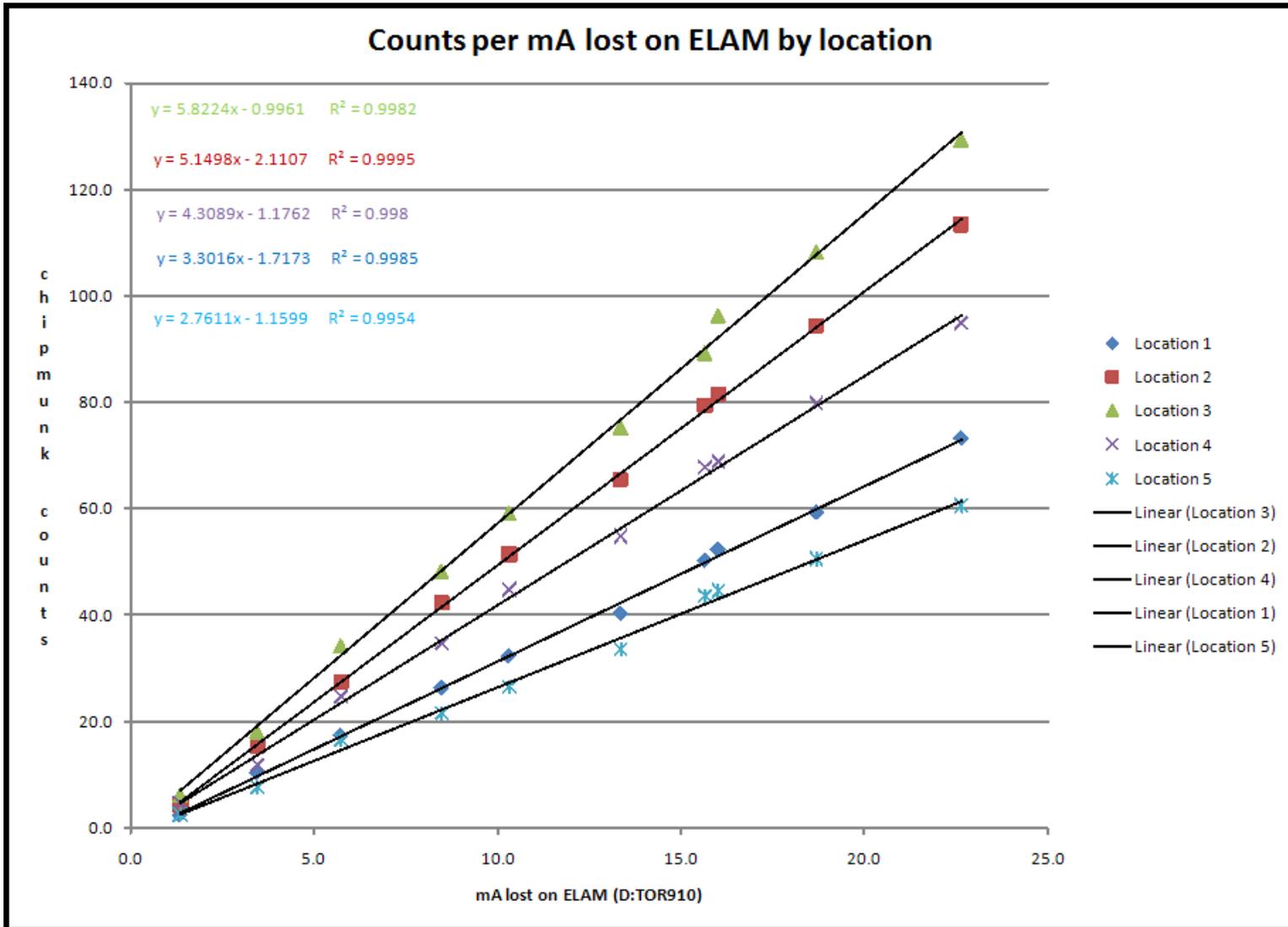
35 Booster buckets - $15.7E10$ protons

Others in 5 bucket increments from 5 to 50

Recorded response of 5 chipmunks

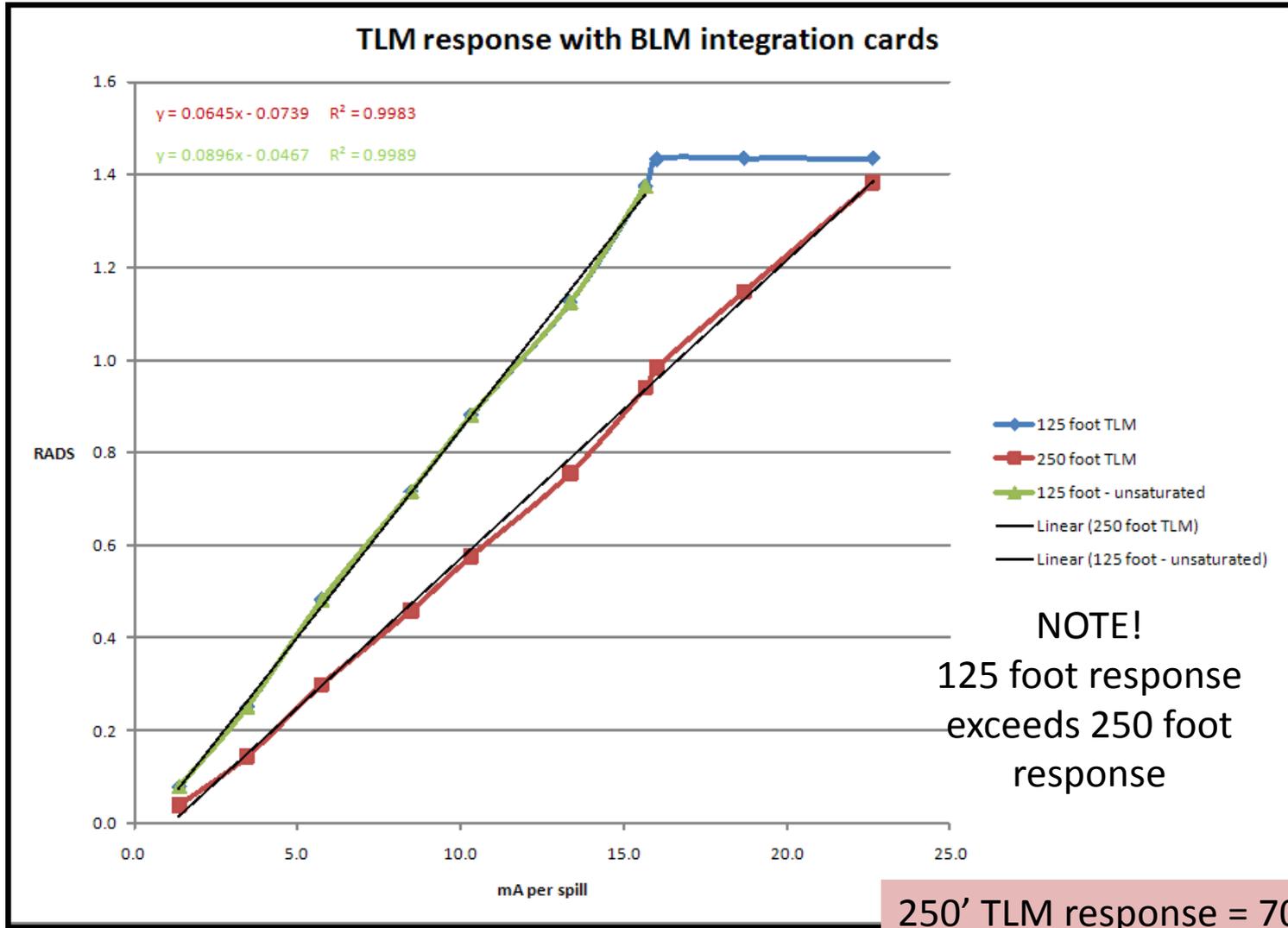


Chipmunk response is linear with number of protons lost



An expected result

TLMs also have linear response!

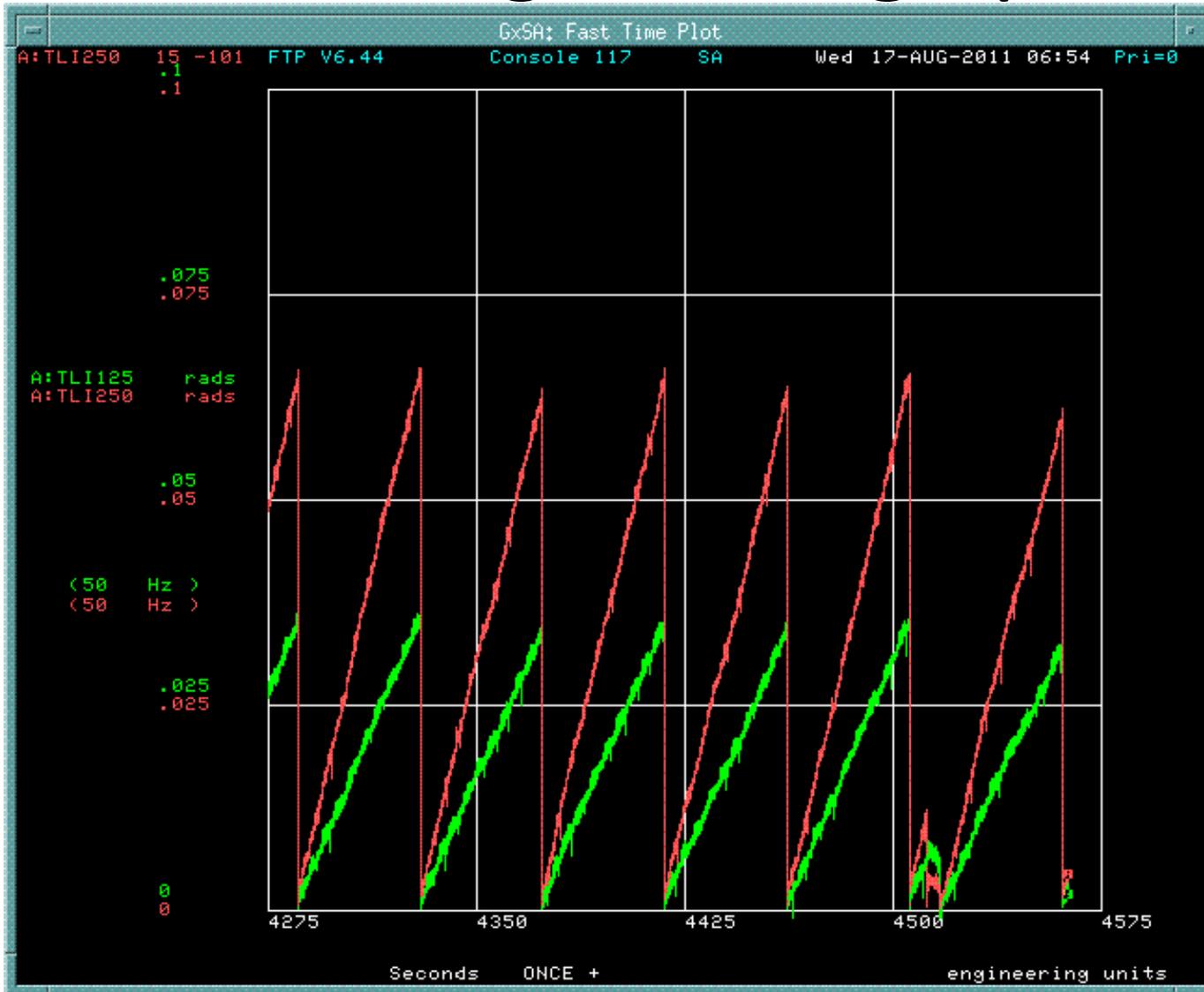


A required result

TLM response as a function of length

- Need another TLM installed to determine this!

During stacking operations

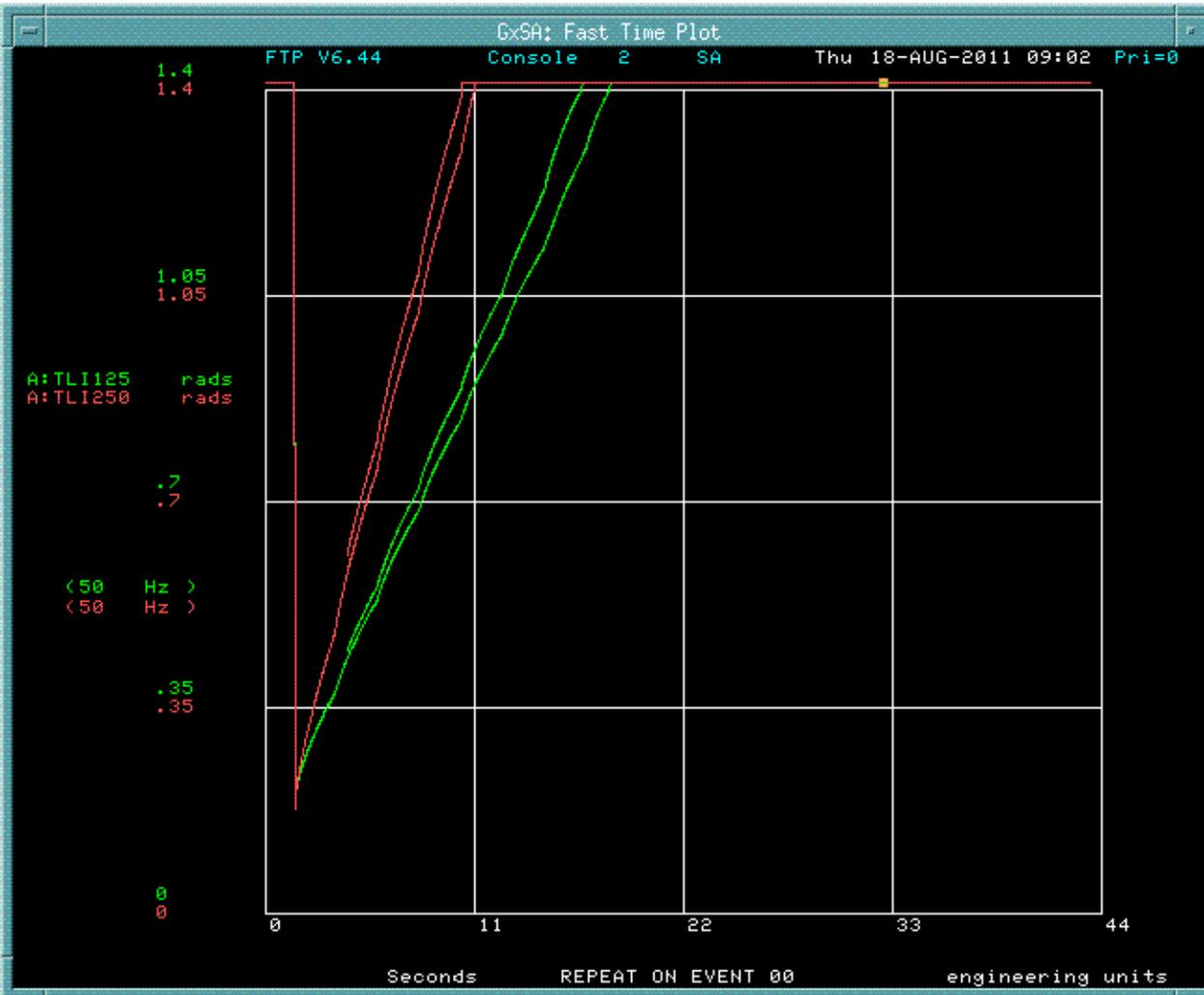


250' cable response exceeds 125' response during normal stacking operations

Could be losses in the second half of 250' TLM not seen by 125' TLM

A reverse proton cycle mixed in with stacking cycles

Tried reversing HV and signal roles of the TLM cable



Huge apparent increase
in sensitivity

Perhaps should be
repeated – ensure
conductors are
grounded before turning
on HV

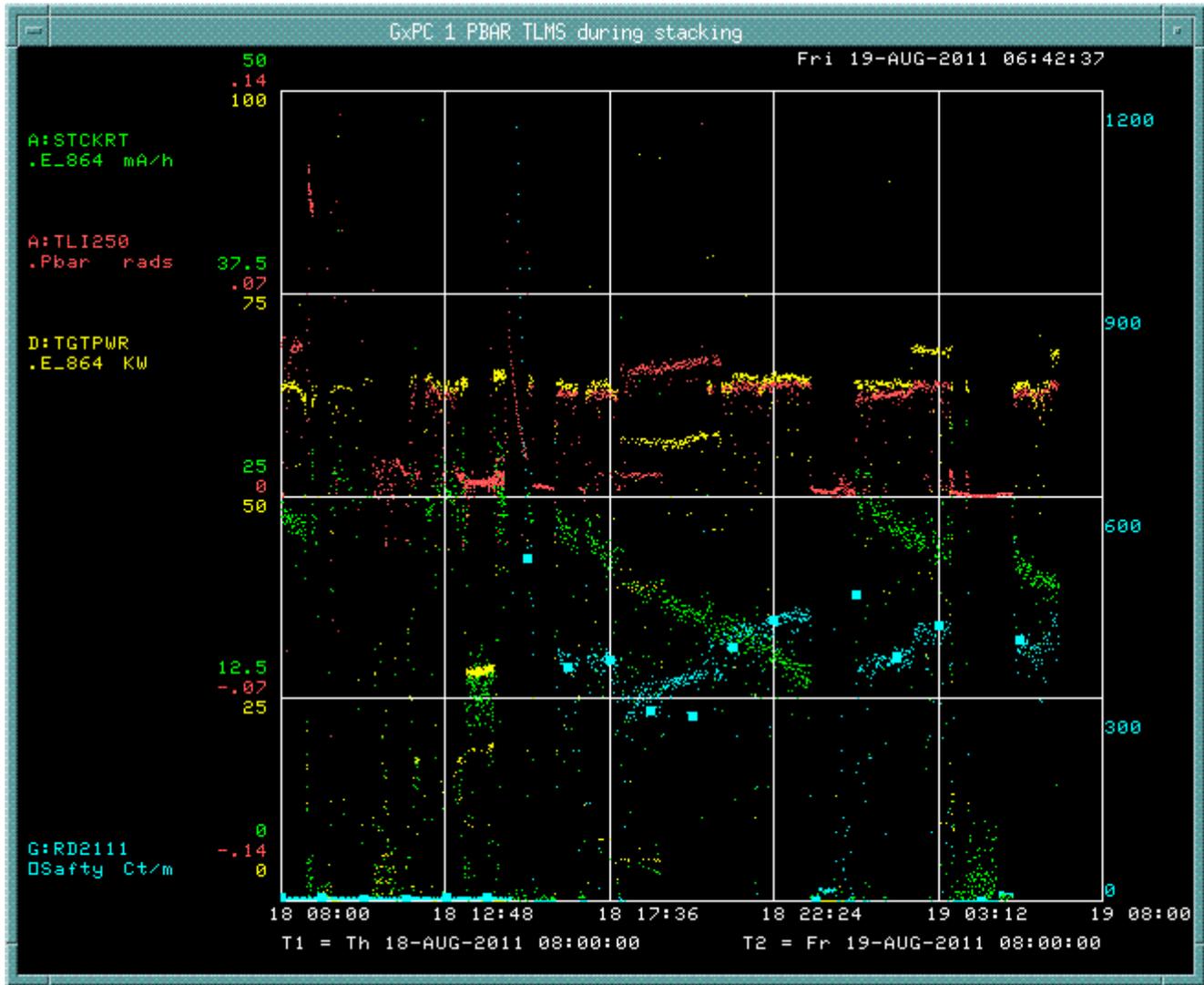
Blue box is in service connected to
125' TLM



Blue box is in service connected to
125' TLM



Blue box is in service connected to 125' TLM



5 pC/count

Follows BLM
card response on
250' TLM

Next steps (1 of 3)

- Install VME scalar for higher counting rate from blue box (1 kHz)
 - MUX good for 70 Hz
 - VME scalar good for 15 kHz
- Repeat series of measurements with blue box and BLM chassis two ways
 - Blue box/125' & BLM chassis/250'
 - Blue box/250' & BLM chassis/125'
 - Determine dynamic range requirement for digitizer circuit for TLM application

Next steps (2 of 3)

- Install third TLM of different length 103 m (338')
 - Determine TLM response as function of length
 - Can't do this with just 2 cables
 - Repeat measurements (5 Booster bunch increments)
- Determine how AD instrumentation can make additional blue boxes
 - In collaboration with ES&H Section
 - Would help to speed up development of this resource

Next steps (3 of 3)

- Distributed loss study
 - e.g., Scrape at ELAM with Accumulator bend bus off (October 2011?)
- Determine blue box trip levels for 14 TLM cables required for mu2e
 - Needed to finalize radiation safety plan for mu2e