

# D0 Luminosity Monitor - status and stability-

2008. 9.24 Yuji Enari

## Radiation damage on Scintillator

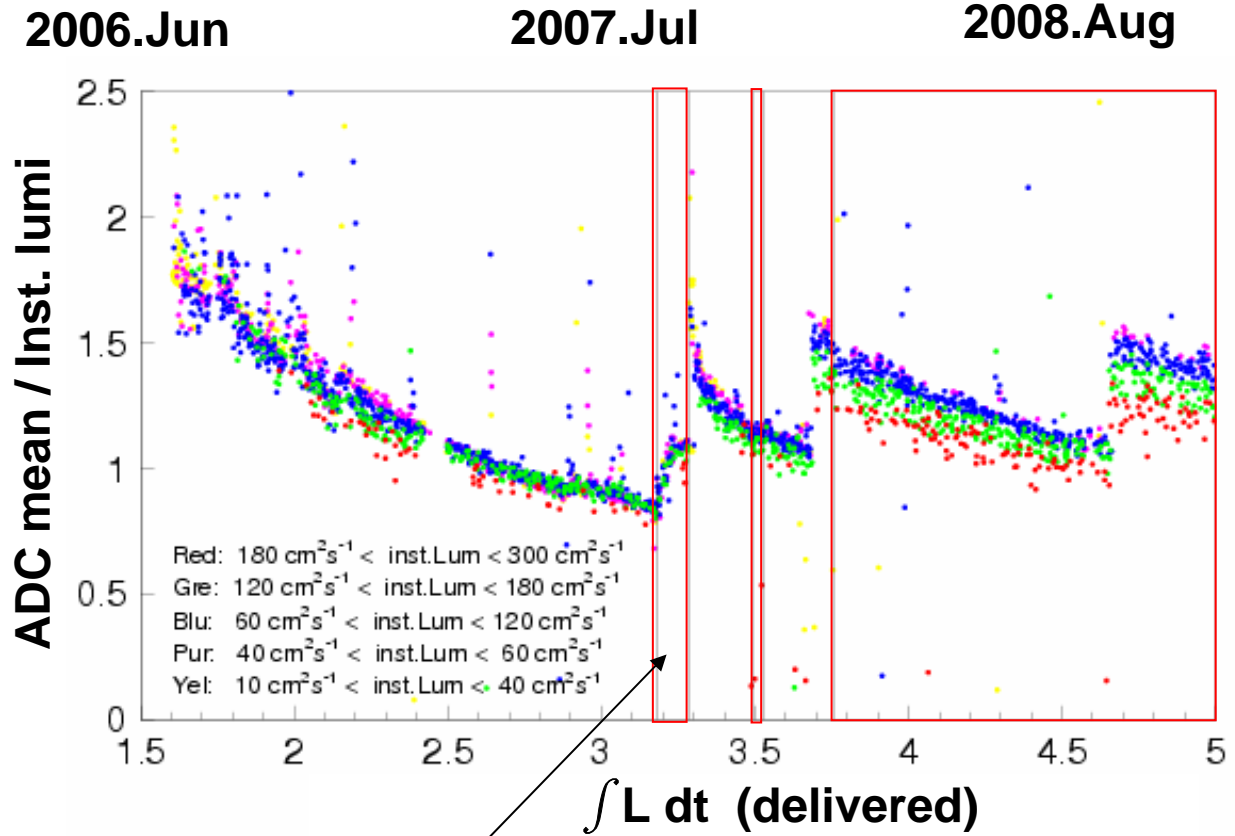
- How to monitor?
- About purge
- Update on HV setting
- Stability



Monitoring variable:

$$\frac{\text{ADC} / \text{inst. lumi}}{\int L dt}$$

In 1st order, it should be flat as far as light yield is stable.

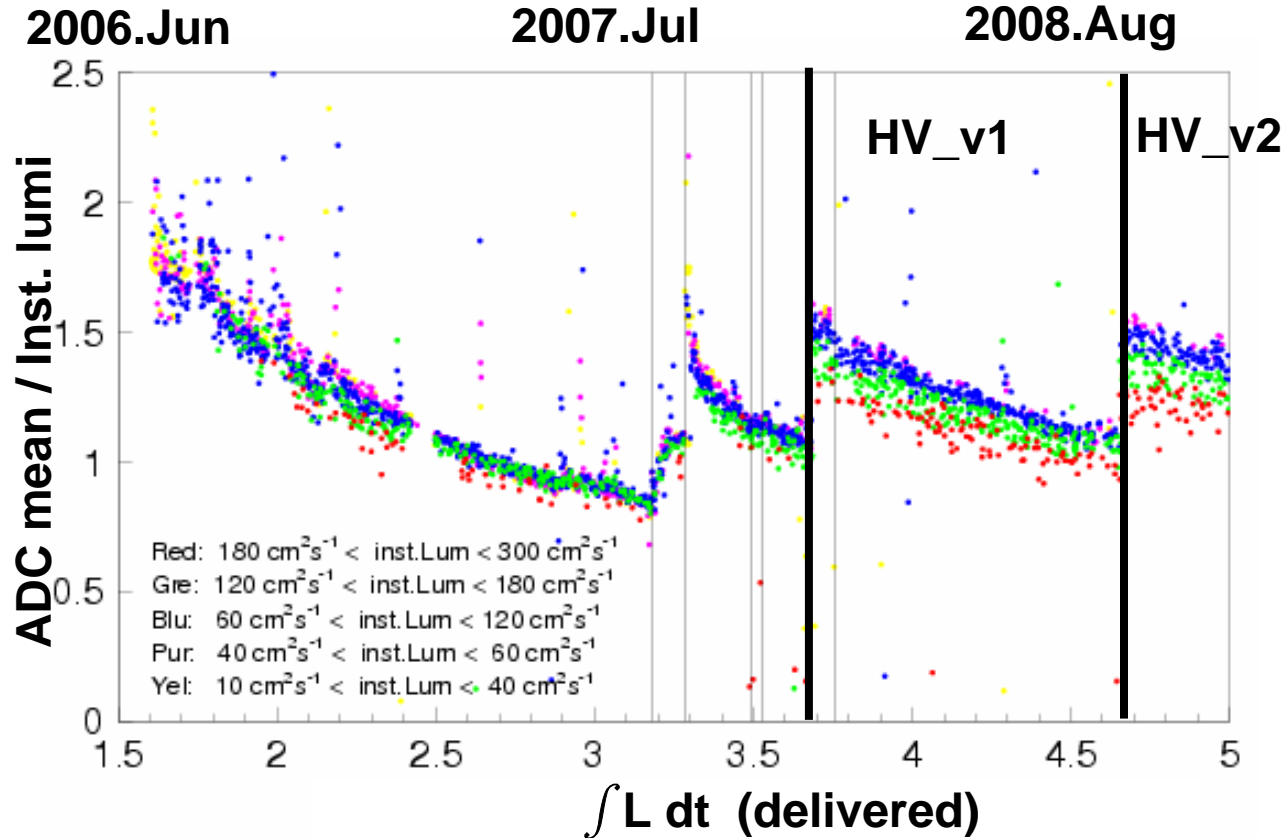


- PMT?
- Purge: Nitrogen to DryAir (period in the red box)
  - Significant improvement on light yield (2007.Jul.11-Shutdown)
  - After additional short and long term test, we decided to switch Dry Air
  - Since 2008.3.11, switched Dry Air from Nitrogen.

Monitoring variable:

$$\text{ADC / inst. lumi} \\ \text{vs} \\ \int L dt$$

In 1st order, it should be flat as far as light yield is stable.

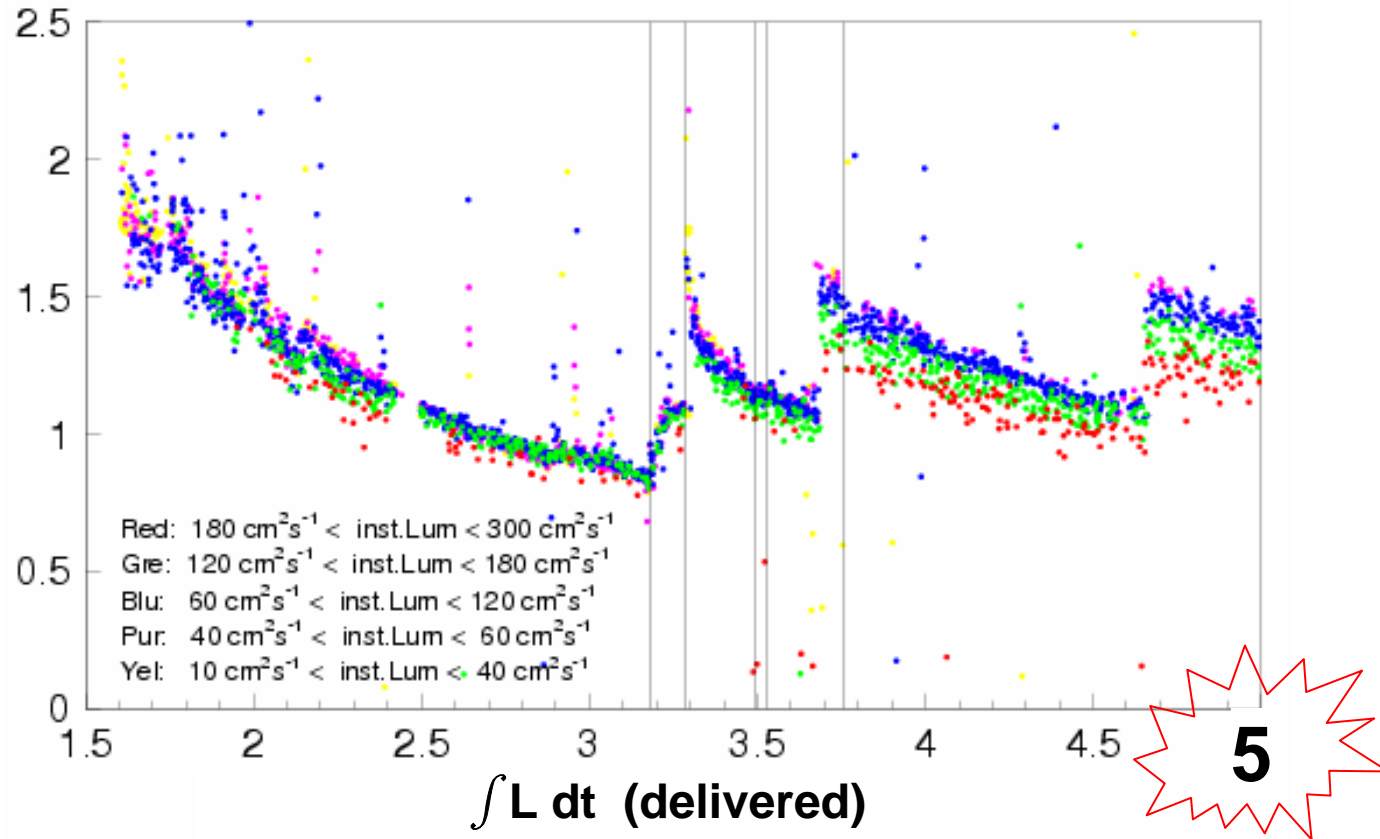


- Replacement of scintillator

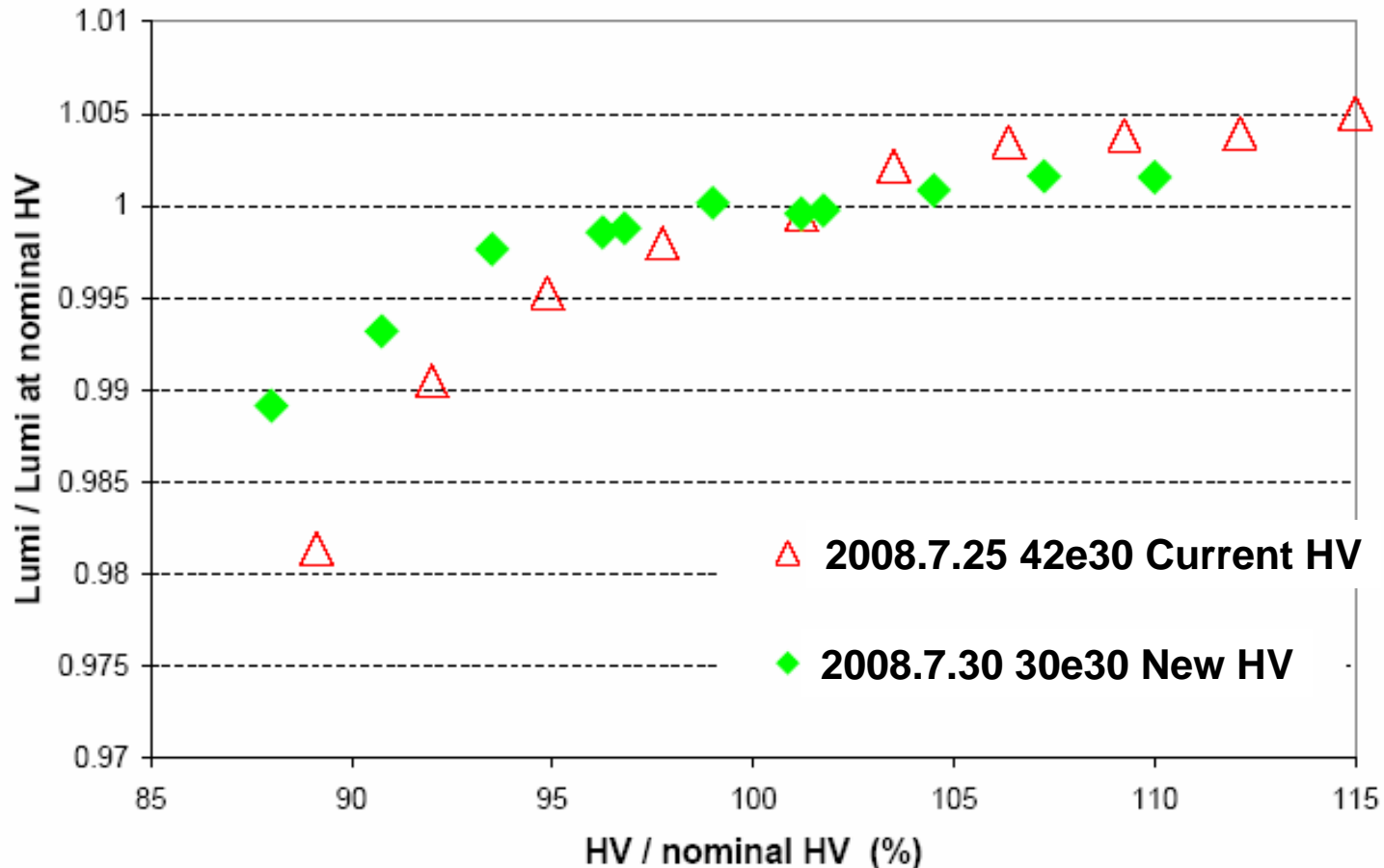
- 2006 shutdown (RunIIa→RunIIb)
- 2007 Summer shutdown.
- 2009 Spring shutdown

- Raising HV

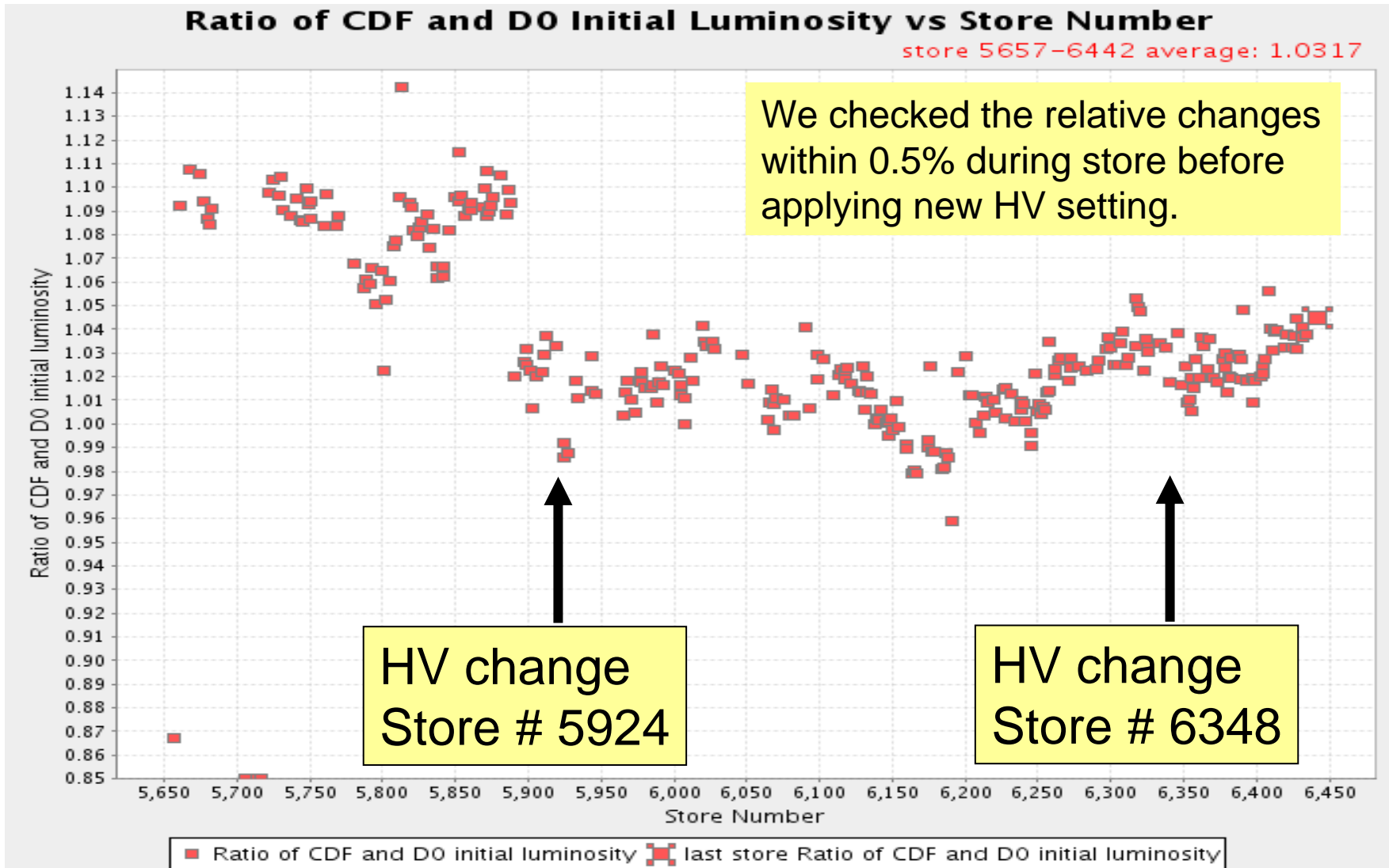
- update due to the rad damage.
  - 1<sup>st</sup>: 2008. Feb 22 (store 5924)
  - 2<sup>nd</sup>: 2008. Aug 7. (Store 6348)
  - 3<sup>rd</sup> : 2008. Dec????



- Delivered luminosity has reached  $5\text{fb}^{-1}!!$
- Thank AD very much for great effort!



- HV scan result before and after updating HV setting.
  - Plateau nicely come back after applying new HV setting.
- On average, we raised HV by 5%.



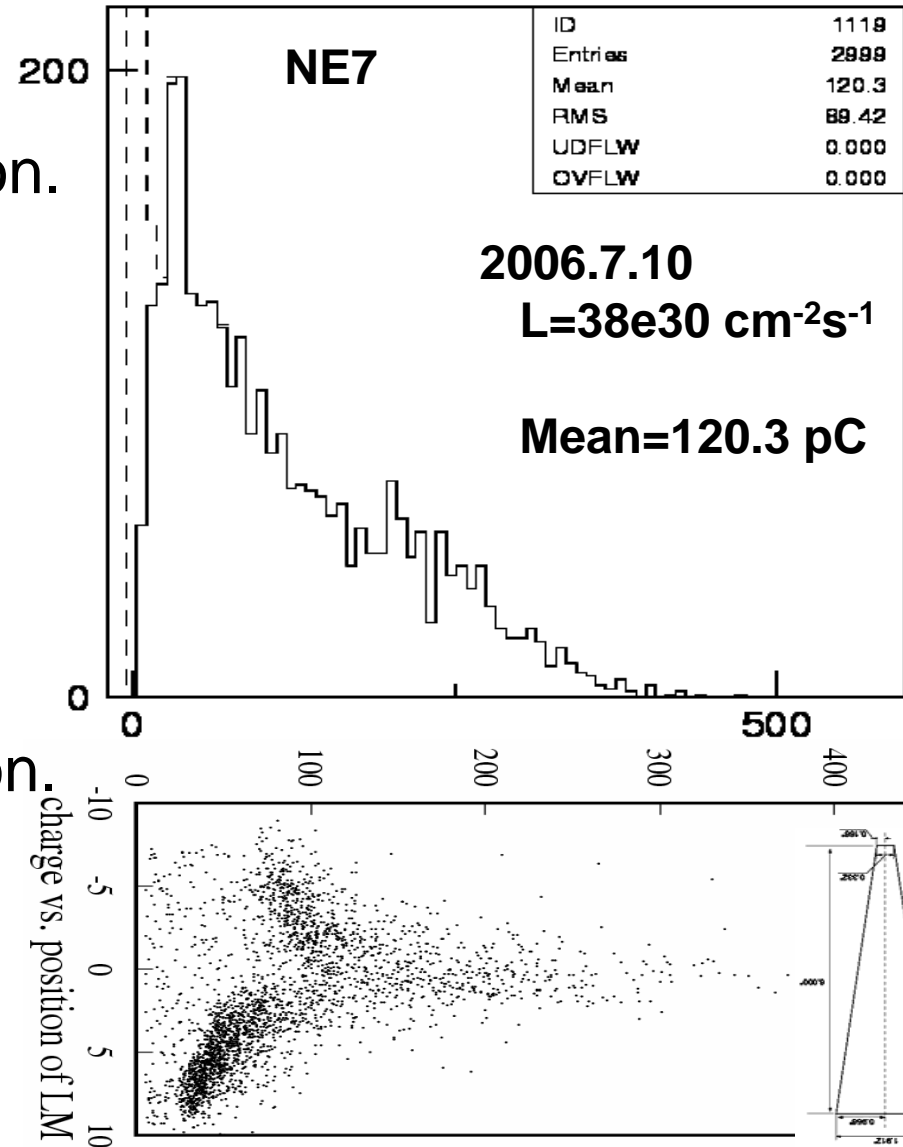
- Replace all scintillator due to radiation damage
  - PMTs are same, none were replaced.
  - Light yields return to levels observed at start of RunIIb
- Result of HV scan indicates that we are operating on plateau. Our target on stability is  $\sim 0.5\%$ .
- Very stable operation is on going.
- We plan to replace scintillator again at coming long shutdown.





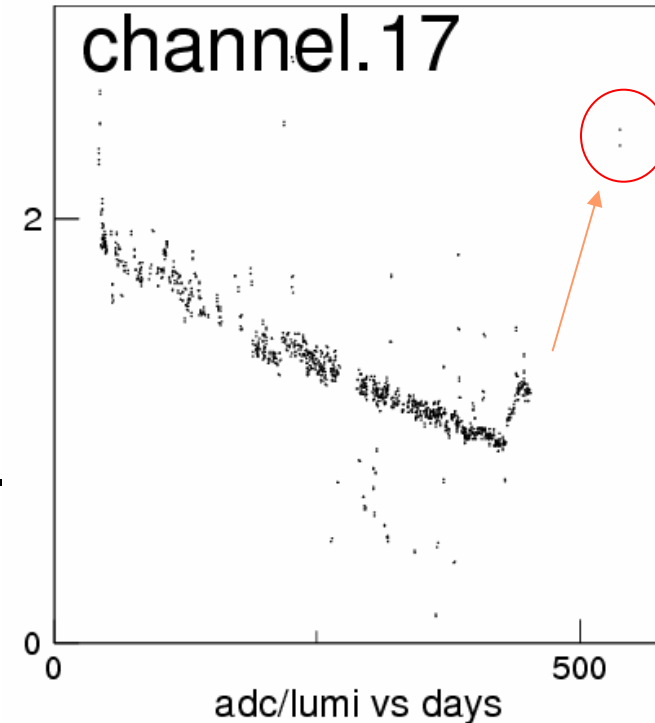
Note:

- Charge is function of hit position.
    - Higher tail: under PMT.
    - Middle: Inner (narrow) part
    - Lower tail: outer (wider) part
  - Dot hist: without TDC hit
  - Solid hist: with TDC hit
- Clear noise/signal separation.



First store: Oct 28 (Sun)

- Data with HV setting of before shutdown  
Observe recovery on ADC/Lumi to same level at beginning of RunIIb.
- Update HV setting
  - Apply new HV setting mid of 1<sup>st</sup> store.
- Update T0 (pass2 constant) between 1<sup>st</sup> and 2<sup>nd</sup> store.
  - All channel look good and no problem



Normal operation has resumed since 3rd store.