An electronic clock for correlated noise measurements in BNL-AGS Experiment 896.

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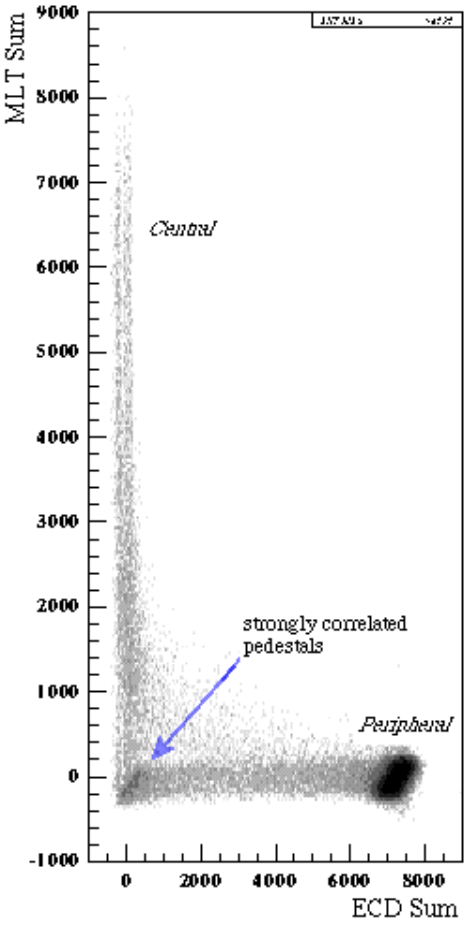
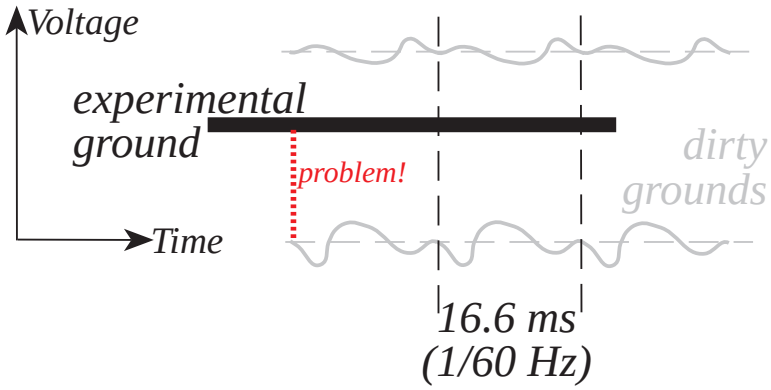
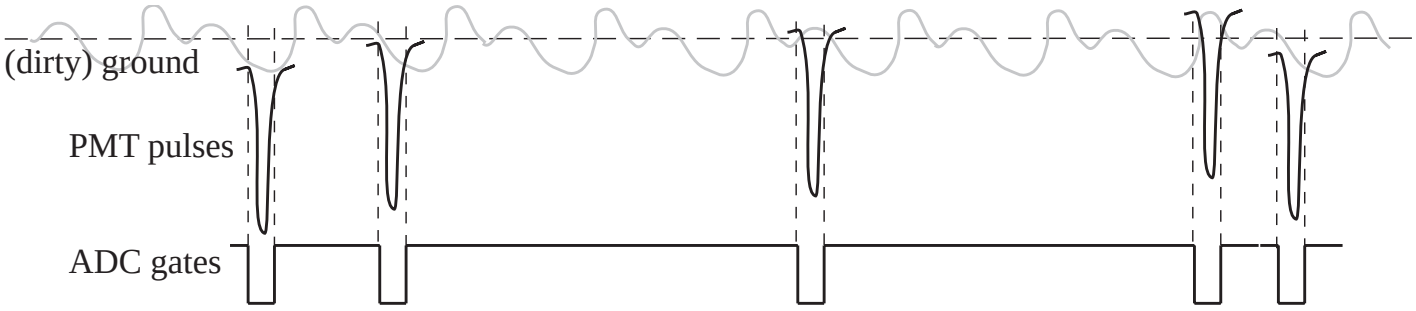
The Symptom:
- Wide ADC pedestals…
- *Correlated* ADC pedestals…

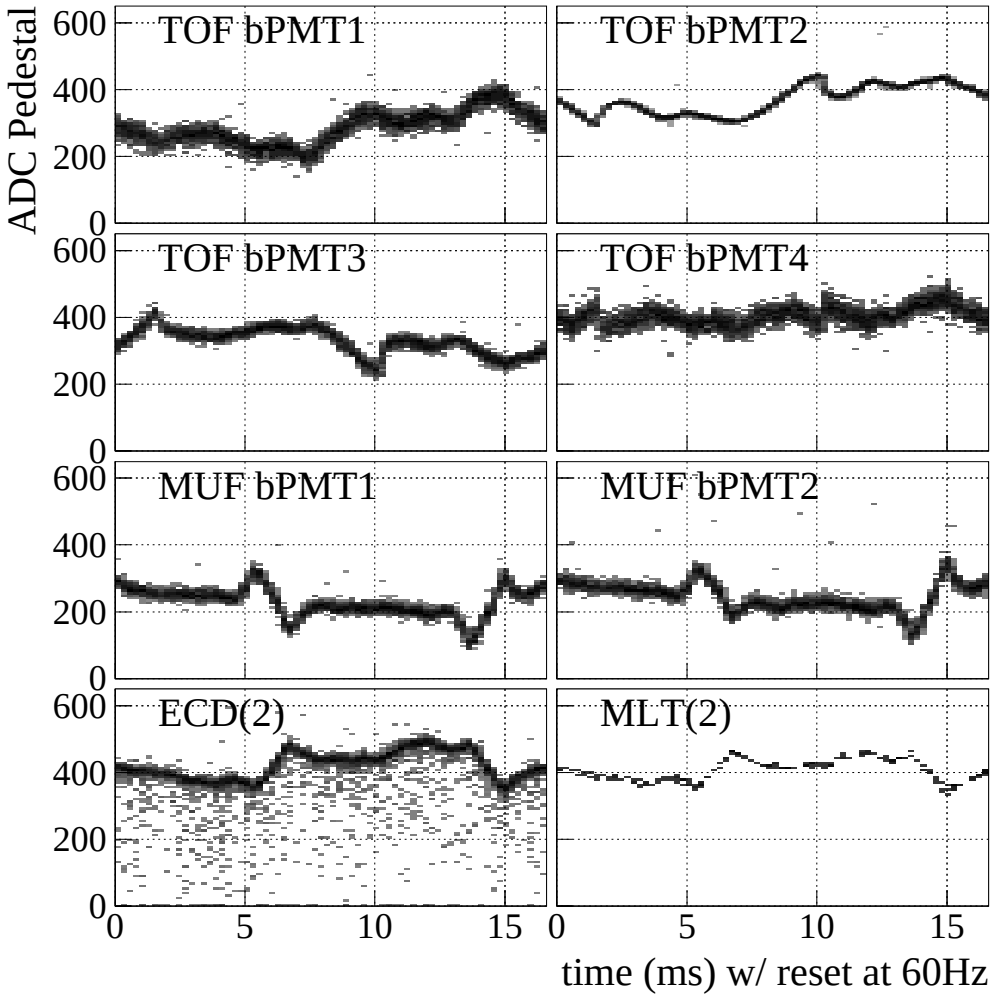
Indicates:
- there is >1 electrical ground…
- dirty grounds are connected to the experimental one…
- the exp. ground carries current....







Once correlated noise is in the system, it is *everywhere*…



In TOF Systems, this correlated noise:

Widens ADC pedestal…

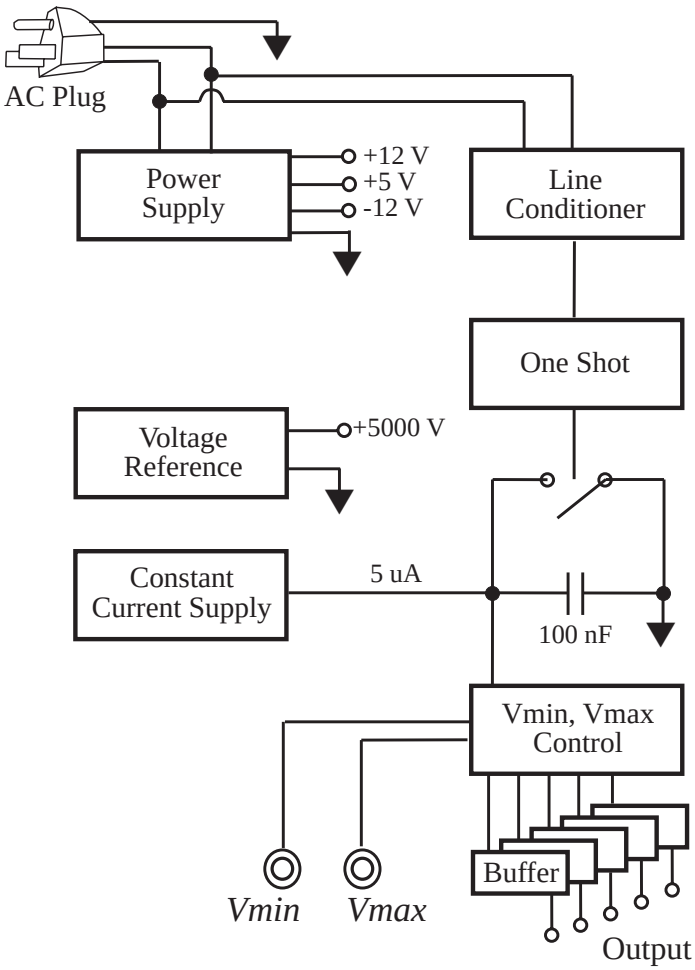
Worsens charge resolution by smearing ADC values…

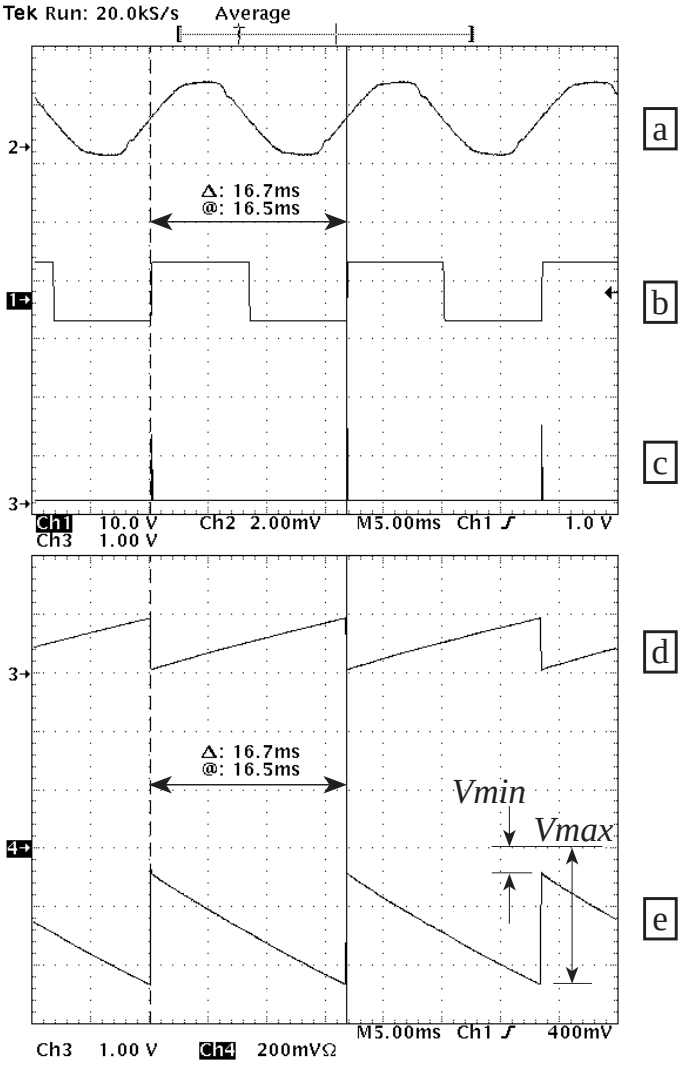
Worsens TDC corrections (“slewing “) that use ADC information…

Need to measure the time each event occurs, relative to 16.6 ms intervals that are synchronized with the AC line…

Allows the correction for the noise channel by channel…

The Electronic Clock…





"Ramp" signals input to spare channel in an ADC and digitized as if another PMT channel…

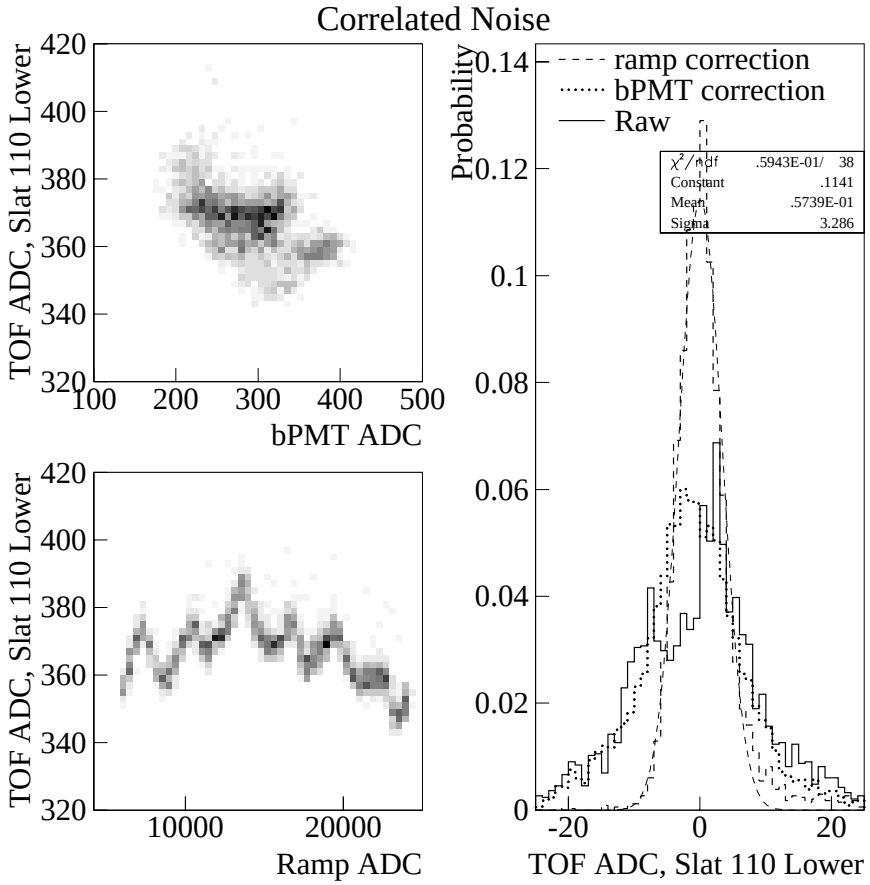
Value of "Ramp ADC" directly proportional to the line-synchronized time the event occurred as measured within 16.6 ms intervals…

A continuously running, actively synchronized, clock with a dial resetting 60 times per second…

Extremely portable and cheap.

The performance

An alternative approach to a correction: “Blackened PMTs” –
electrically the same, but photocathode is covered…
measure only the correlated noise component…
must be on the same local ground as the PMT to be corrected!



Ramp correction always “works”…

Reduces PMT pedestals to expected value of ~3 ADC channels…

Restores expected ADC performance to values given a clean ground…