Pedestal Observations

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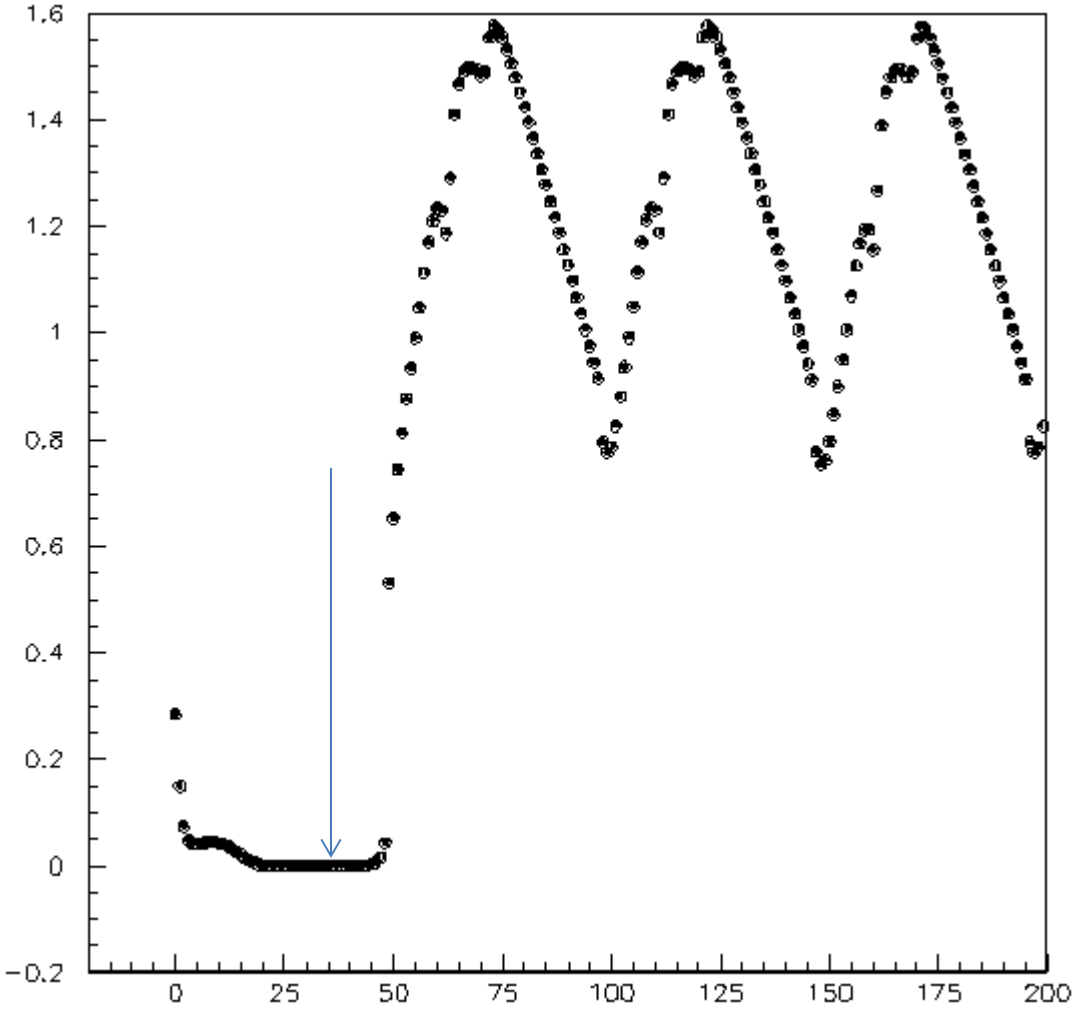
Starting Point

- Kabir's compressed data set (~16,000 of each run type)

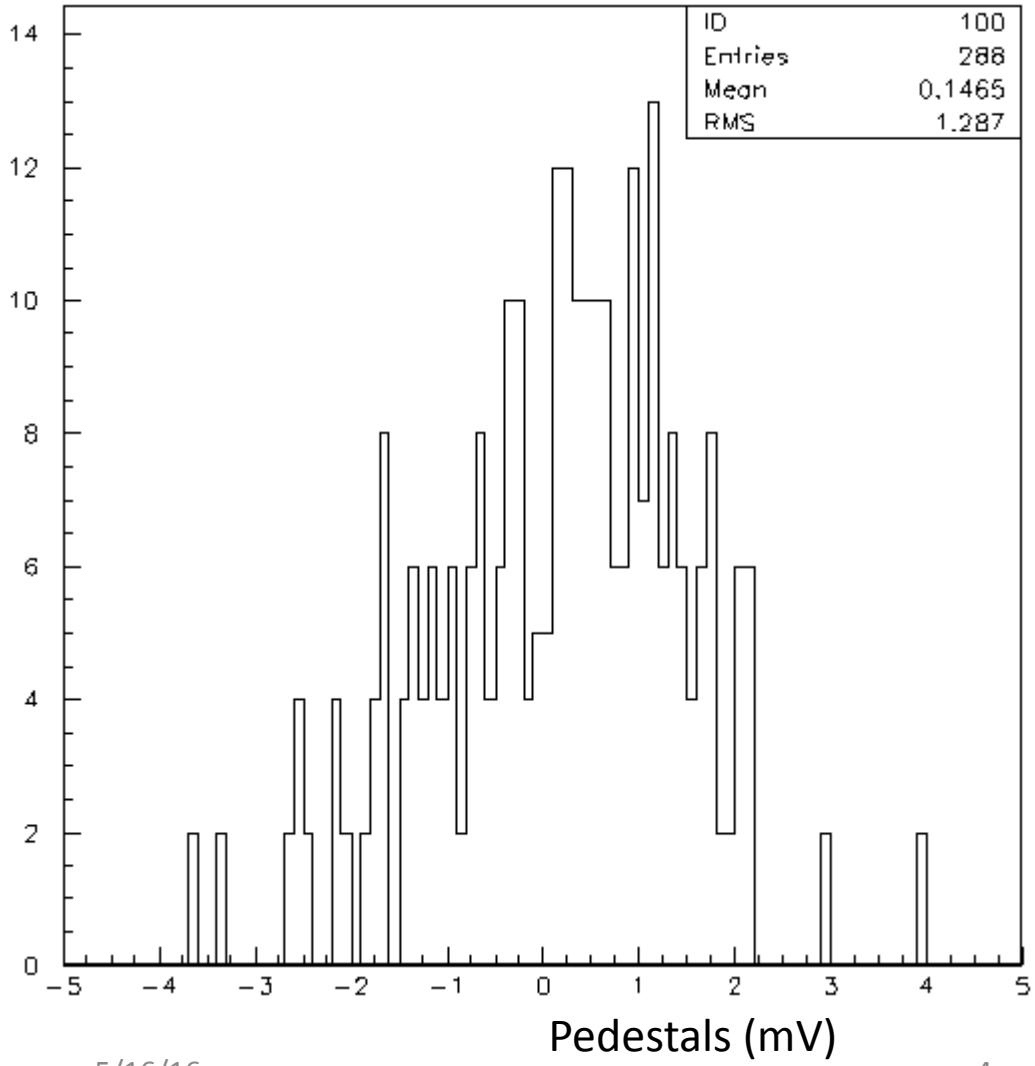
Pedestals

- I’ve shown the first 4 pulses in a 600-pulse sequence for one channel.
- This is the average pulse over 16,000 runs
- For the pedestal value I use the: average yield in time bin 36 of dropped pulse



Pedestal Values

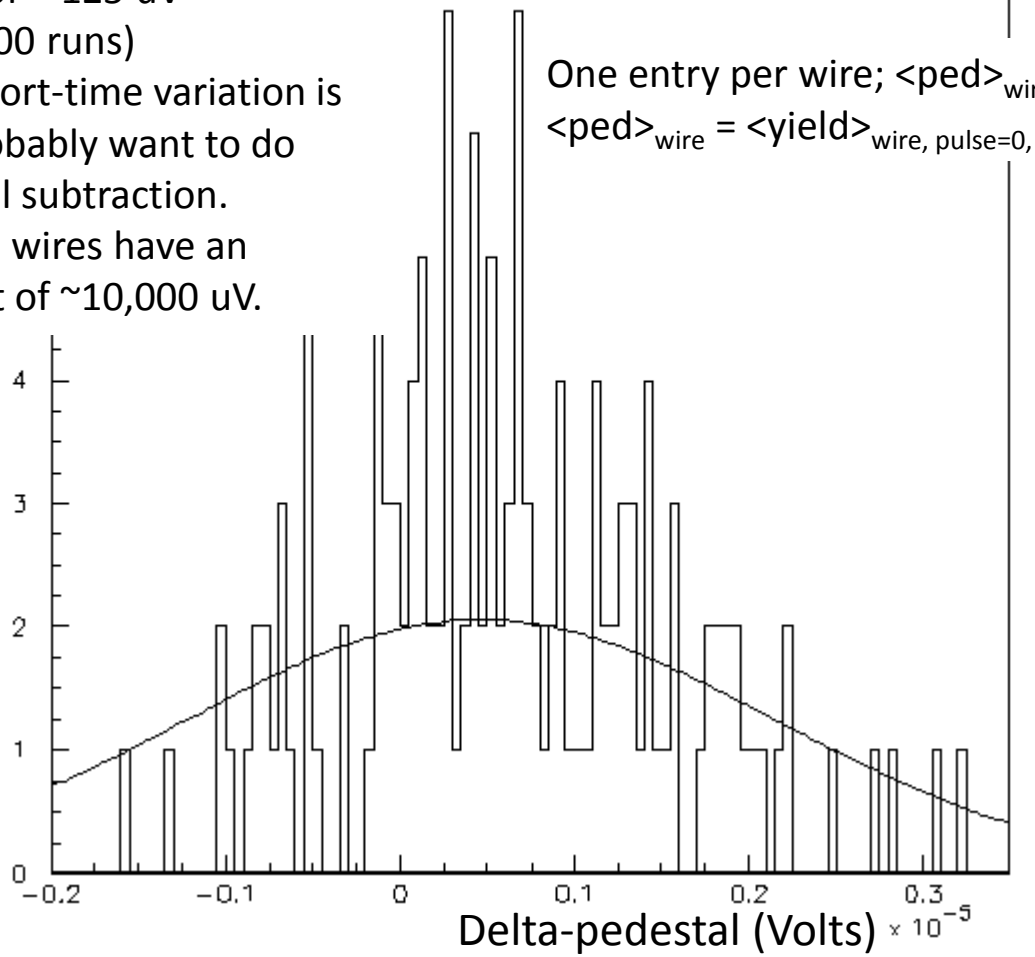
- Here I've plotted one pedestal entry per wire for each of the two dropped pulse spin-flipper states.
- For scale, back/edge wires have signals of <10 mV, so pedestals can be significant.
- In fact Kabir and I have found several wires w/ very large asymmetries due to signals crossing from positive to negative within a pulse – causes the sum in the numerator to become a difference.

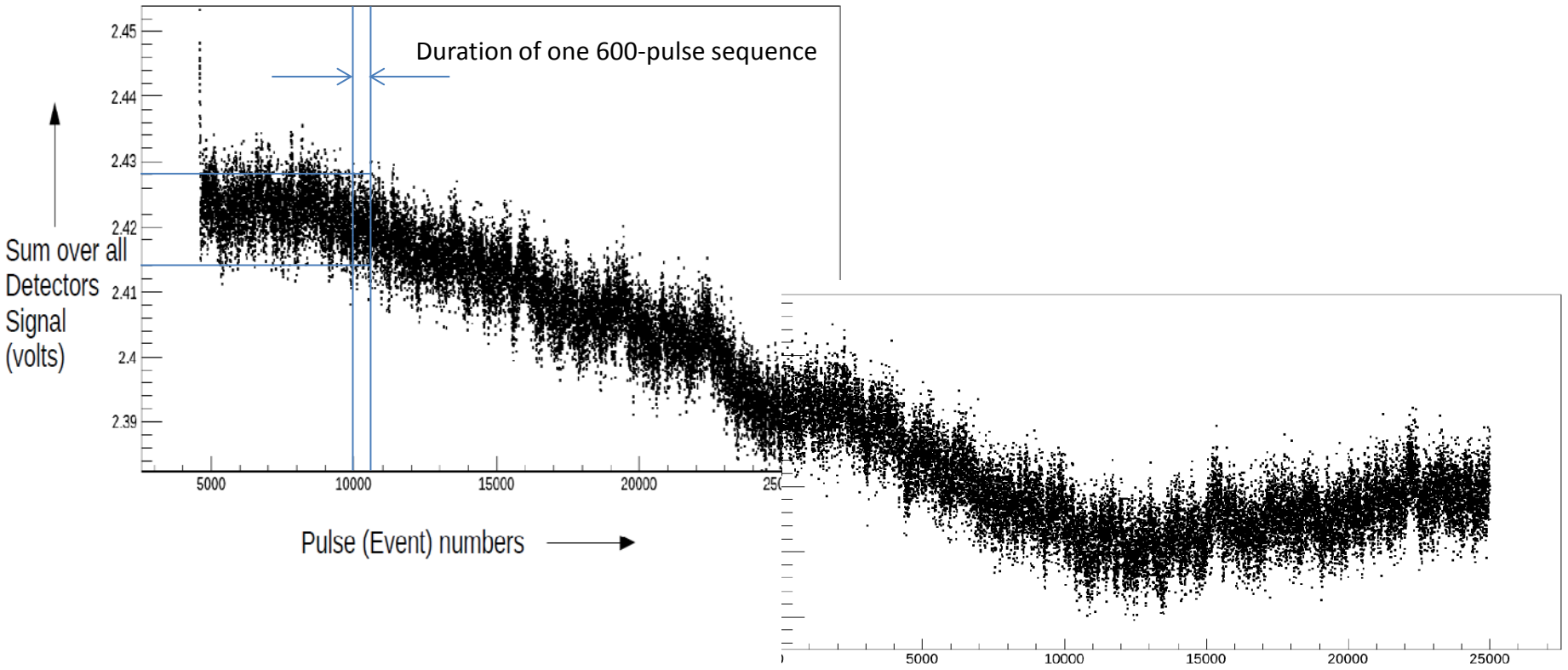


Pedestal Variation

- Gaussian width (1.4 uV) implies underlying pedestal variations of ~ 125 uV (1.4 = 125/sqrt(16,000 runs)
- Since (I think) the short-time variation is less than this we probably want to do "time-local" pedestal subtraction.
- For scale: back/edge wires have an average pulse height of ~10,000 uV.

One entry per wire; $\langle ped \rangle_{wire,\ dpsf=off} - \langle ped \rangle_{wire,\ dpsf=on}$
$\langle ped \rangle_{wire} = \langle yield \rangle_{wire,\ pulse=0,\ tof=36}$





- Kabir analyzed some runs immediately following beam shut-off, looking for decaying pedestals.
- The plot above was mashed together from his earlier presentation. It shows the pedestal averaged over the entire chamber, pulse by pulse.
- Need to divide y-axis by 144 (# wires) and by 49 (# tof bins) to get average pedestal per wire in units of volts: 2.42V/144/49 = 0.35 mV.
- Using the same normalization we see the short-time variation (within a 600-pulse sequence) is 2 uV – consistent with expectation.
- We can see longer-term variation (time-scale of 5-10 minutes) is 8 uV. This does not account for all the variation seen in 5% dataset (125 uV), but this is only about an hour of data.
- Bottom line though: it appears that a once-per-pulse-sequence pedestal subtraction is sufficient.