

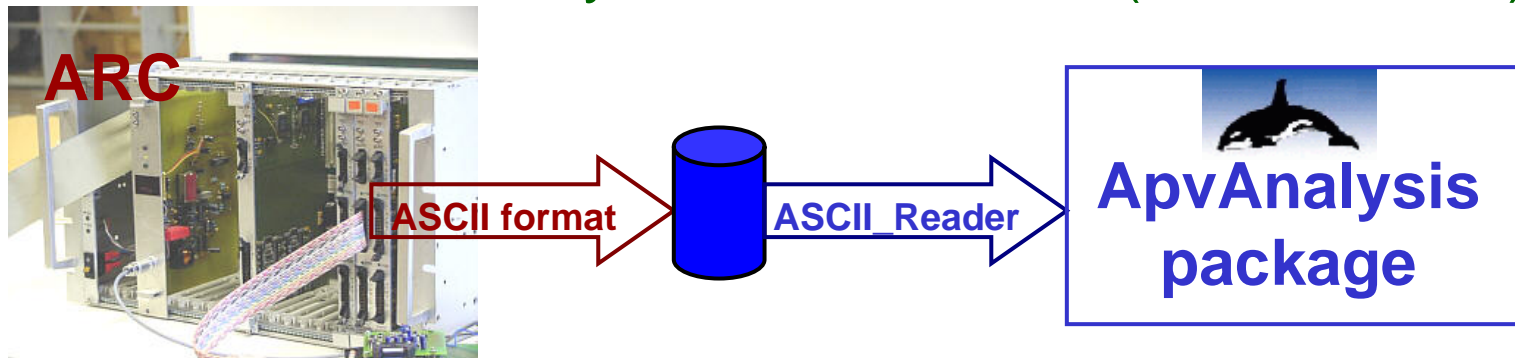
Study of one CMN TOB module using testbeam software

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The Idea

(Marco's idea !)

Study one CMN problematic TOB module using ORCA test-beam software to analyze ARC raw-data (ASCII format).



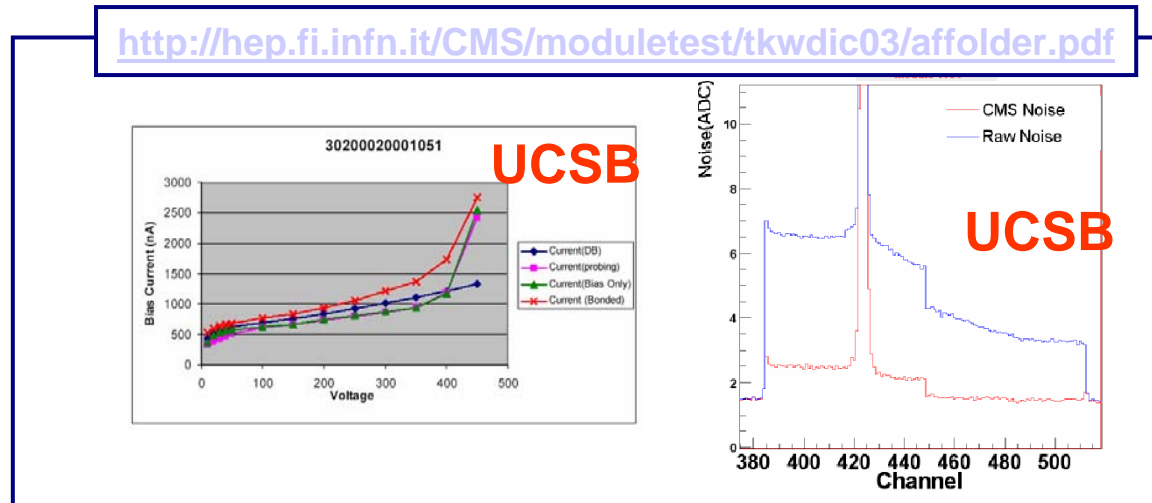
Aim

Perform a HIP-like analysis in order to:

- Check results with different pedestal and CM algorithms
- **Make a scan of the events**: try to figure out the “shape” of problematic events

ARC raw data

- Module 30200020001051 was measured at **UCSB** in **Peak Inv OFF** with the following biases:
HV = 400 V, HV = 450 V, HV = 500 V
- 1051 is one known CMN problematic module:



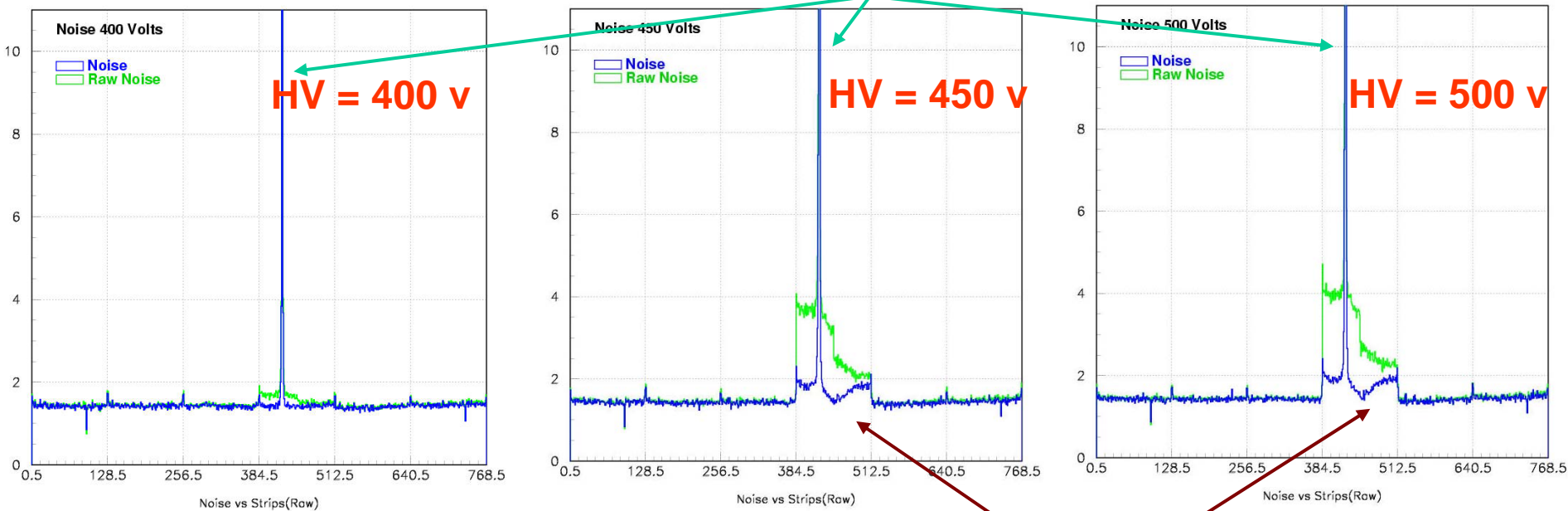
- Integrity of saved data (pipeline, error-bit) is checked by the ASCII_Reader

Results with the test-beam sw analysis

Noise

Testbeam software and ARC analysis basically agree

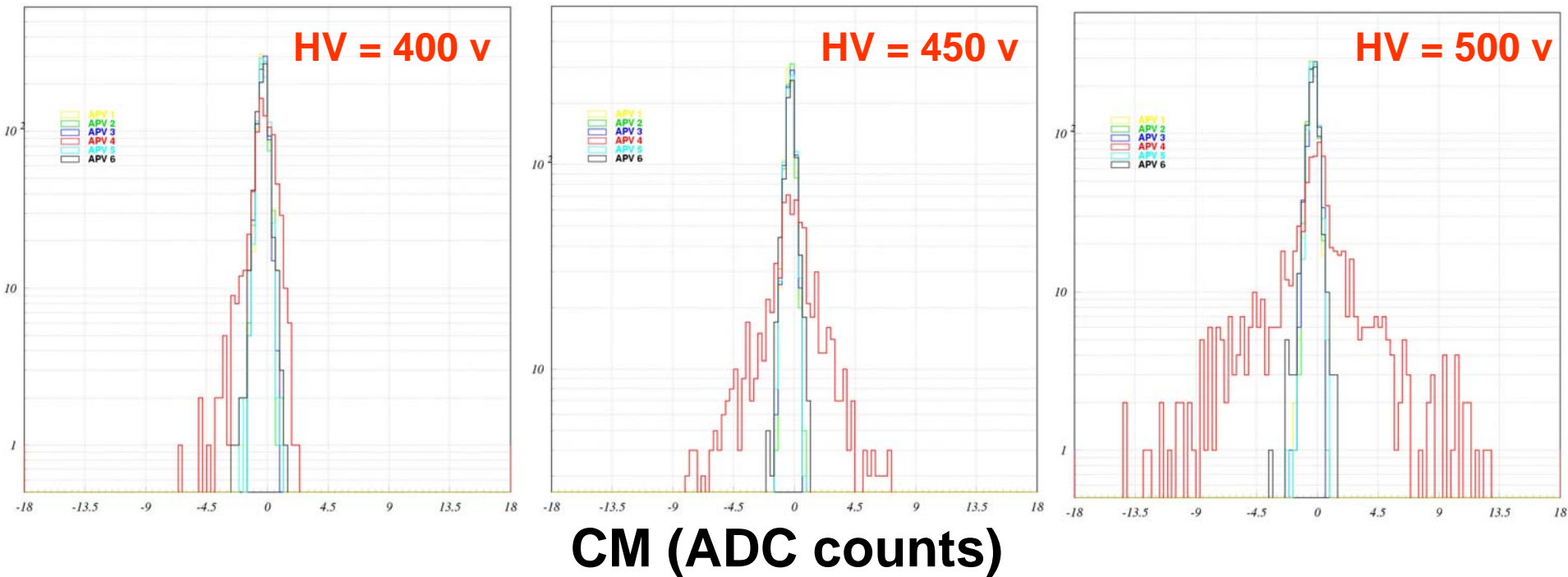
Noise on strips #39 and #40: exceeds 80 ADC



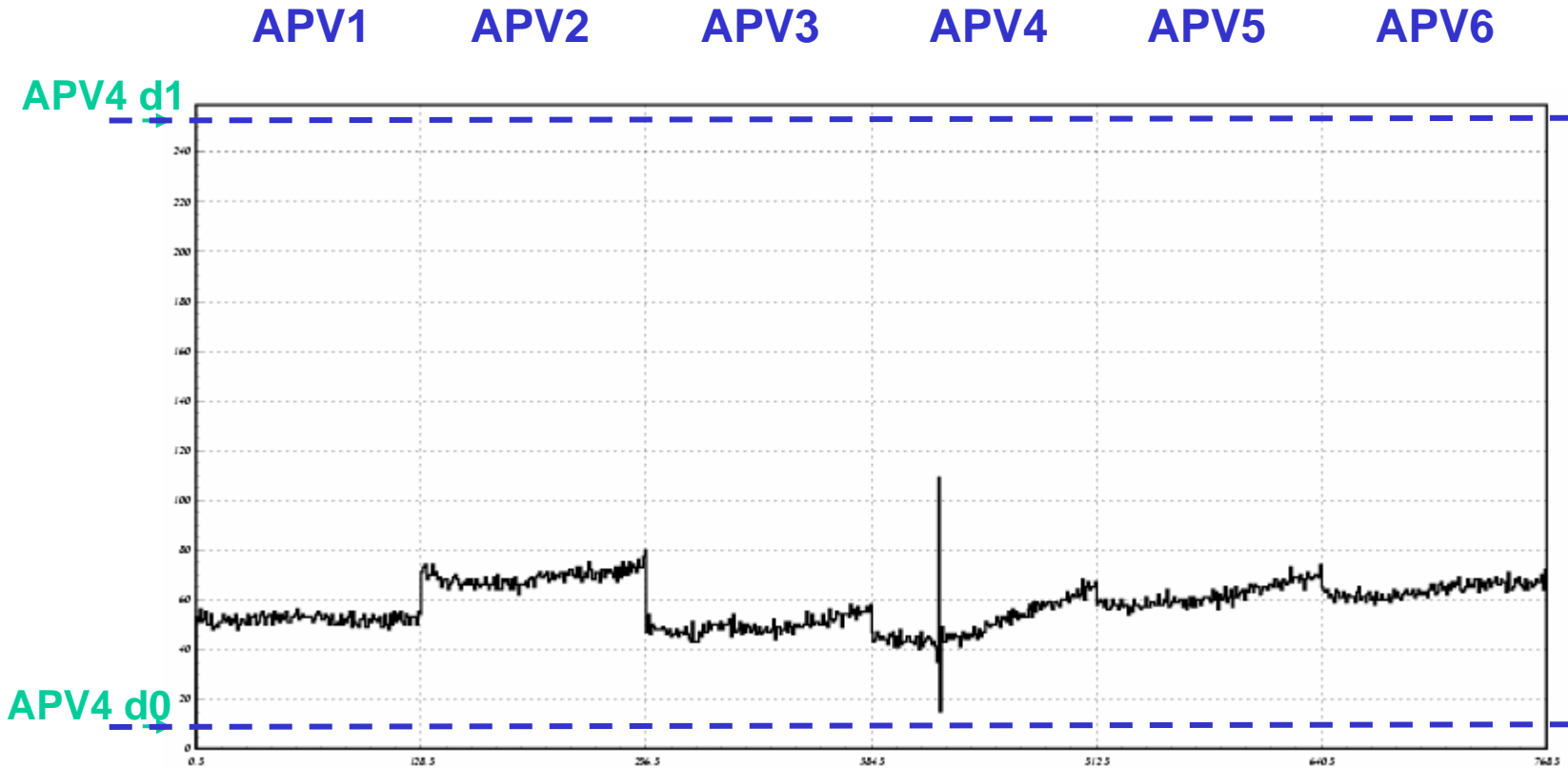
CM subtraction not satisfactory

Common Mode

Median algorithm over 128 strips



Raw data at HV=500 V

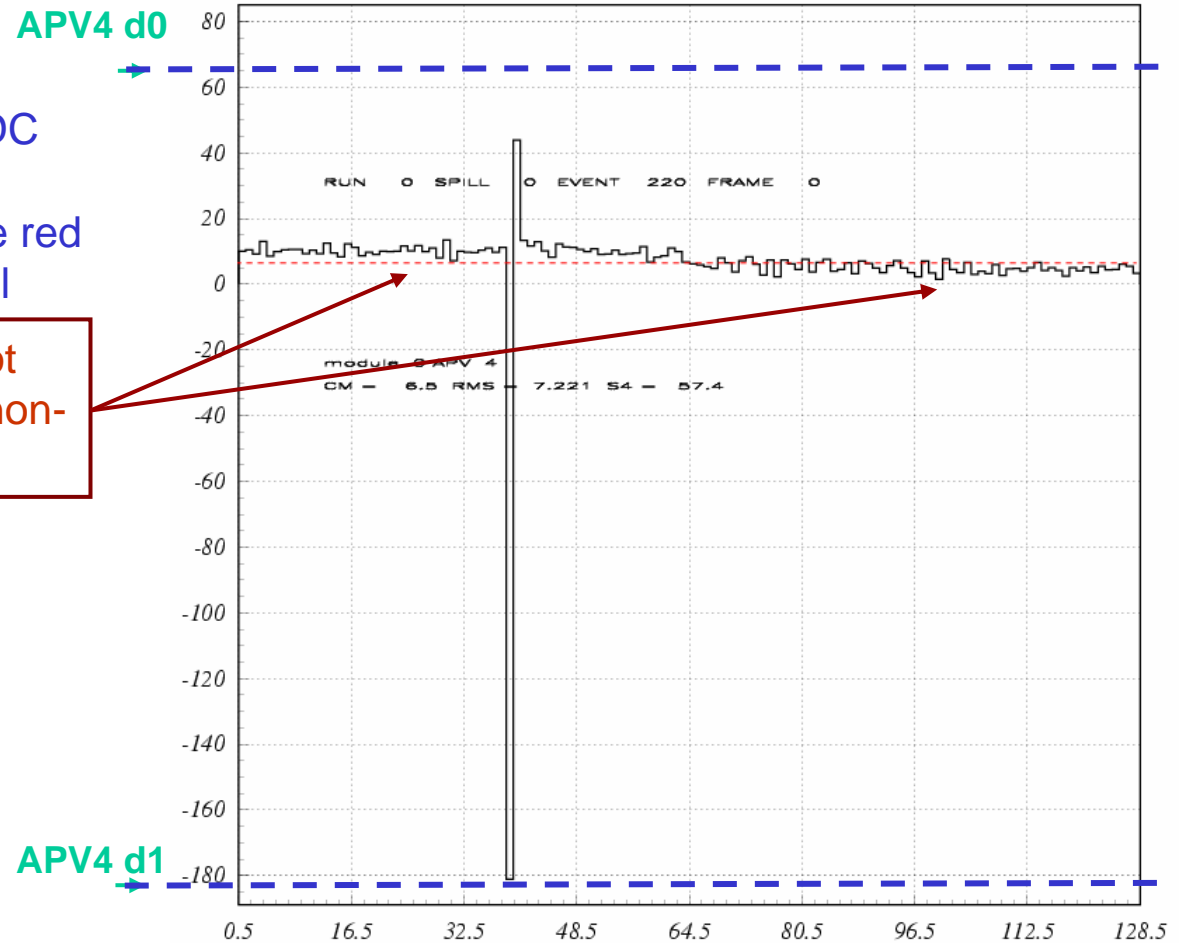


Ped. Sub. data

Pedestal subtracted data (HV=500V)

Data is software inverted (ADC \rightarrow 256-ADC) and pedestal subtraction is performed. The red line is the computed CM level

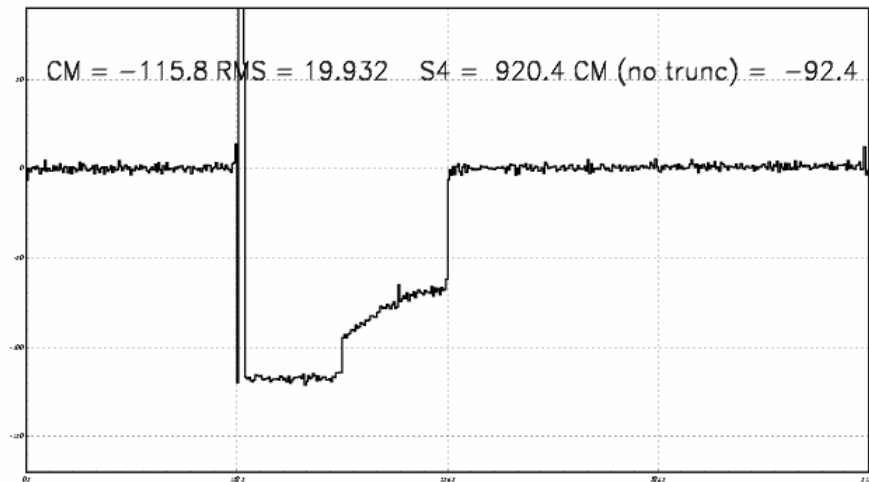
128 strips CM subtraction not satisfactory because of the non-flatness of the baseline



APV “splitting” in HIP events

- The “splitting” of the APV baseline already observed (in a much more dramatic feature) with HIP events
- Happens more often when $R_{inv} = 50 \Omega$

**TOB Module 11
(PSI 2002 beam test)**

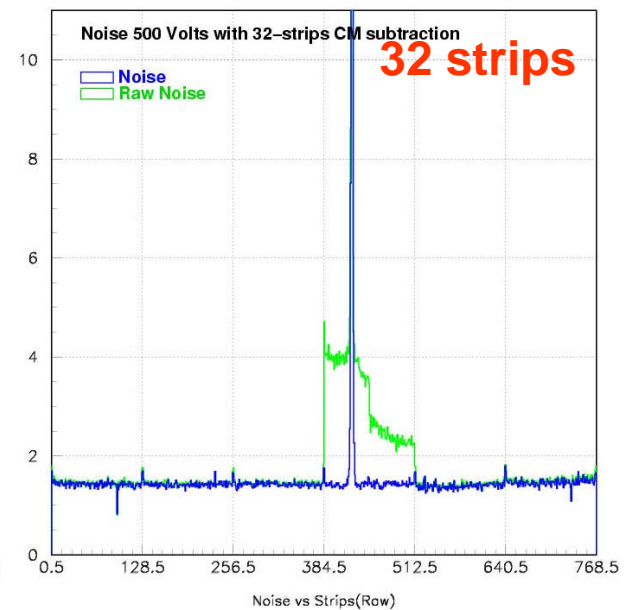
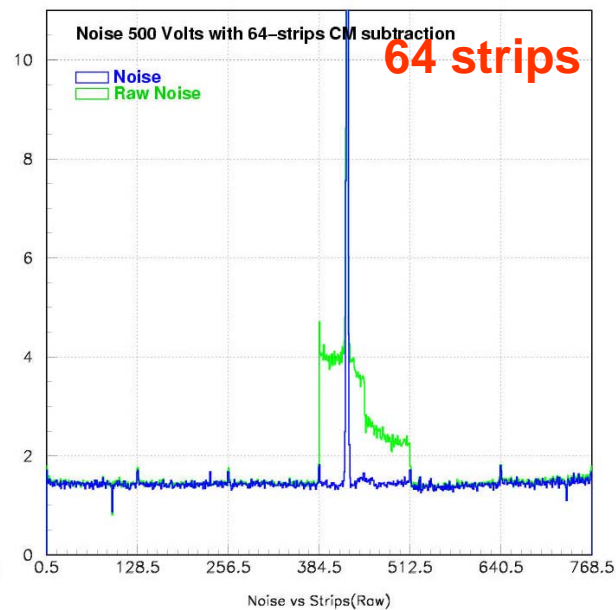
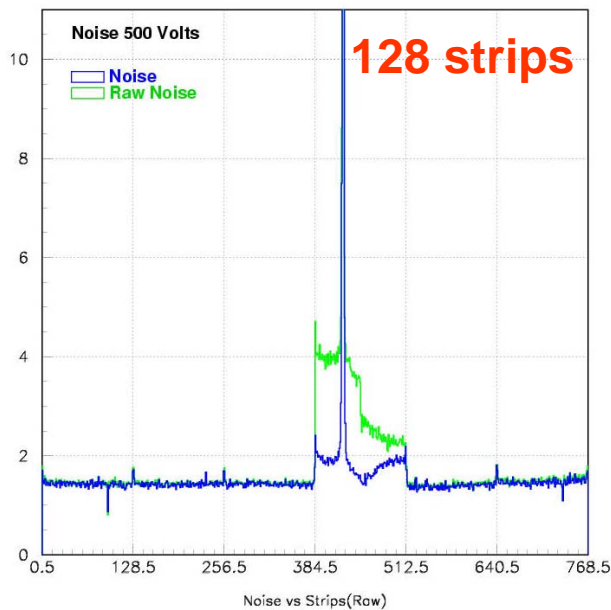


Noise after 64-strips CM subtraction

Satisfactory CM subtracted noise when the median algorithm is applied to 2 groups of 64 strips per APV.

Even better with 4 groups of 32 strips.

Can the FED cope with 64 strips CM grouping ?



Conclusions

- No conclusion, yet: statistics is too low.
- Must repeat on more CMN problematic modules
 - Maybe in **multiframe** mode: can ARC “follow” the swinging APV baseline ?
 - May use a cms-like DAQ ? XDAQ ?
- No evidence found of APV saturation or HIP-like behavior: the CM stays within +/- 15 ADC (up and down).
- Hints that 64-strips CM subtraction leads to a more robust system (may avoid some problems, if any)
- ARC ASCII raw data successfully read with ORCA testbeam software
- ARC and test-beam analysis basically consistent

Many thanks to Antony Affolder for providing UCSB data