Observations with the ORNL Test Stand

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and everyone else at ORNL

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U.S. DEPARTMENT OF ENERGY

Tile Tests

- Most simple cosmics setup:
  - 3 tiles on SiPM test boards, vertically stacked
  - Coincidence trigger on top and bottom tile, middle is device under test (DUT)
  - Running at nominal bias voltage (Vbd + 4V)

- Measure "efficiency" of DUT tile

- Why is there a pedestal/noise peak in the trigger tiles?!
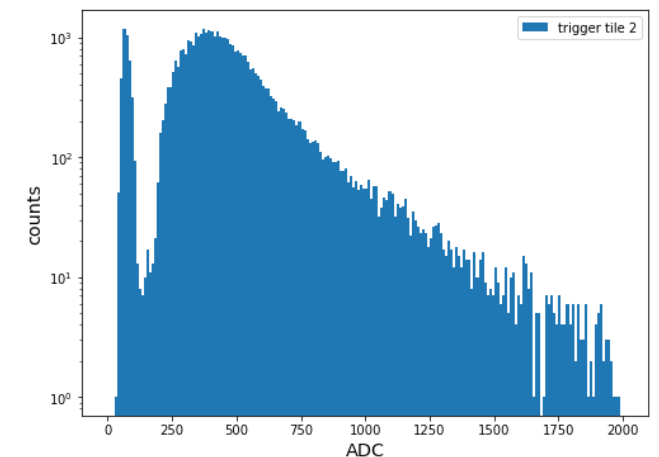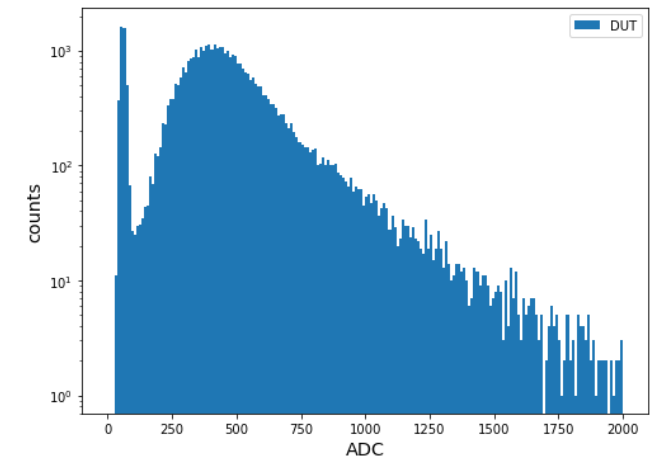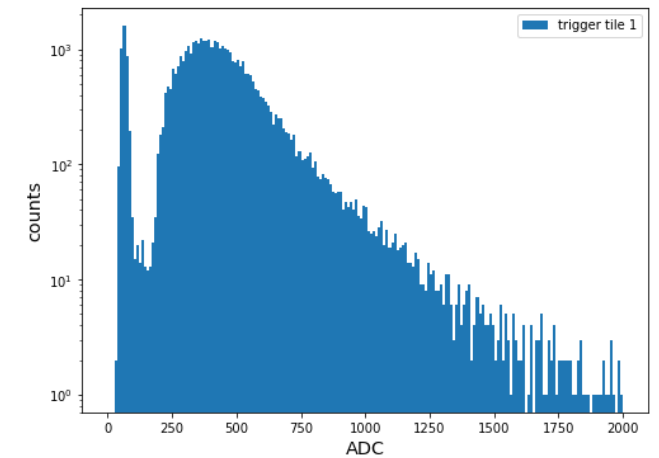
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- Most simple cosmics setup:
  - 3 tiles on SiPM test boards, vertically stacked
  - Coincidence trigger on top and bottom tile, middle is device under test (DUT)
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- Why is there a pedestal/noise peak in the trigger tiles?!
  - Somehow only/mostly at start of run
 - Maybe lab light on/off, but really should not be…

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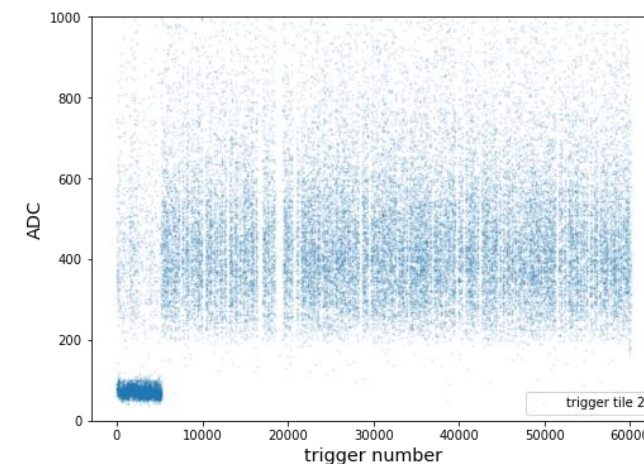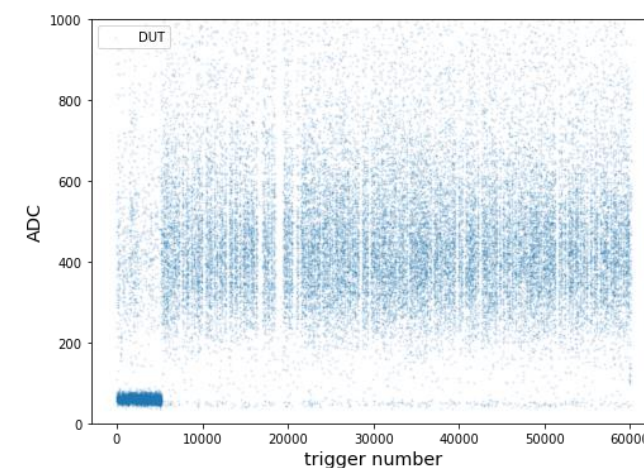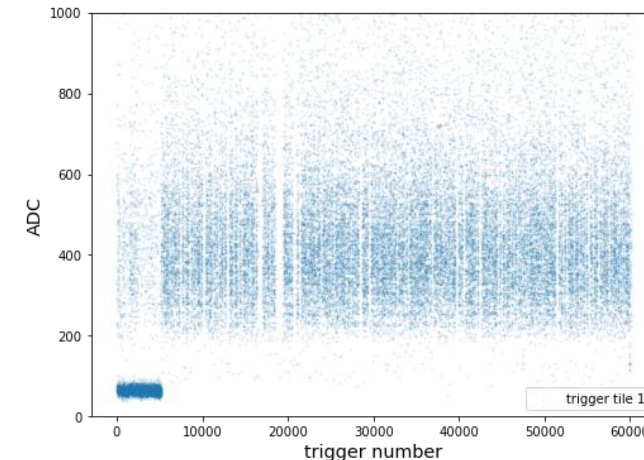
More Mysterious Stuff

- Some events perfectly correlated
  - Coefficient ~1.5 between trigger tiles
  - Coefficient ~0.9 between trigger 1 and DUT
  - Correlation is pairwise
    - removing correlated events between triggers does not remove trigger/DUT correlation
  - Looks like crosstalk. Unsolved.

- Has anyone else seen this with CAEN DT5202 units?
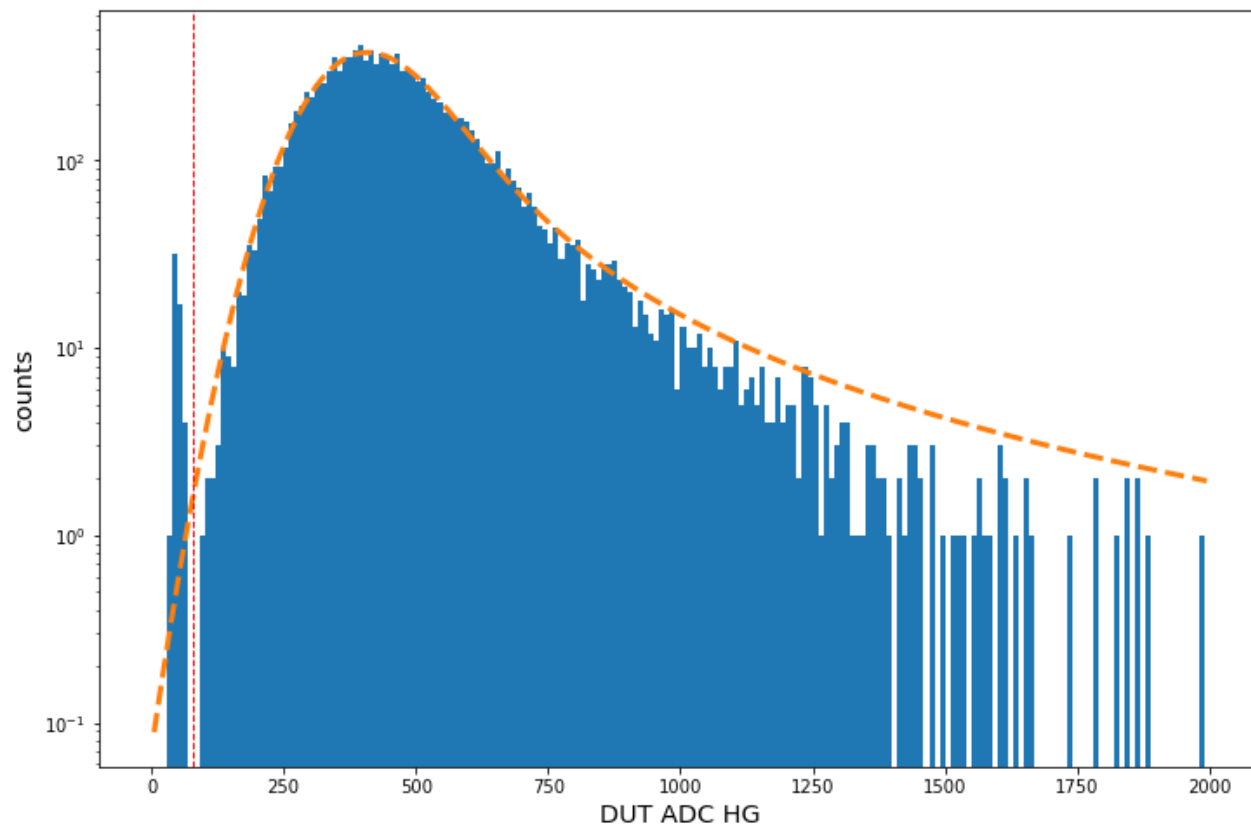
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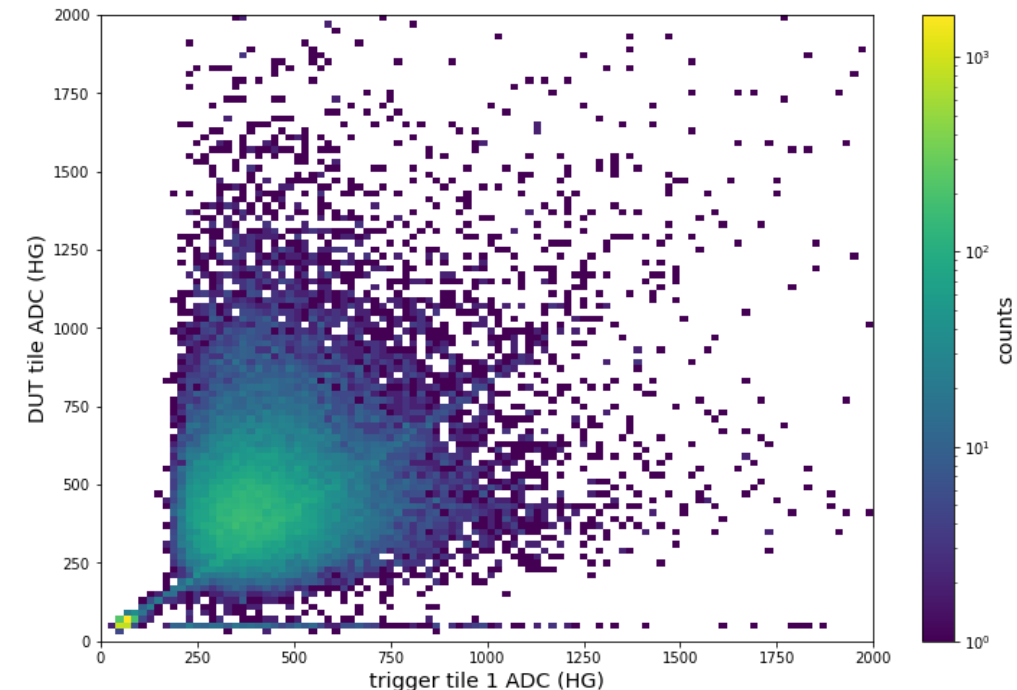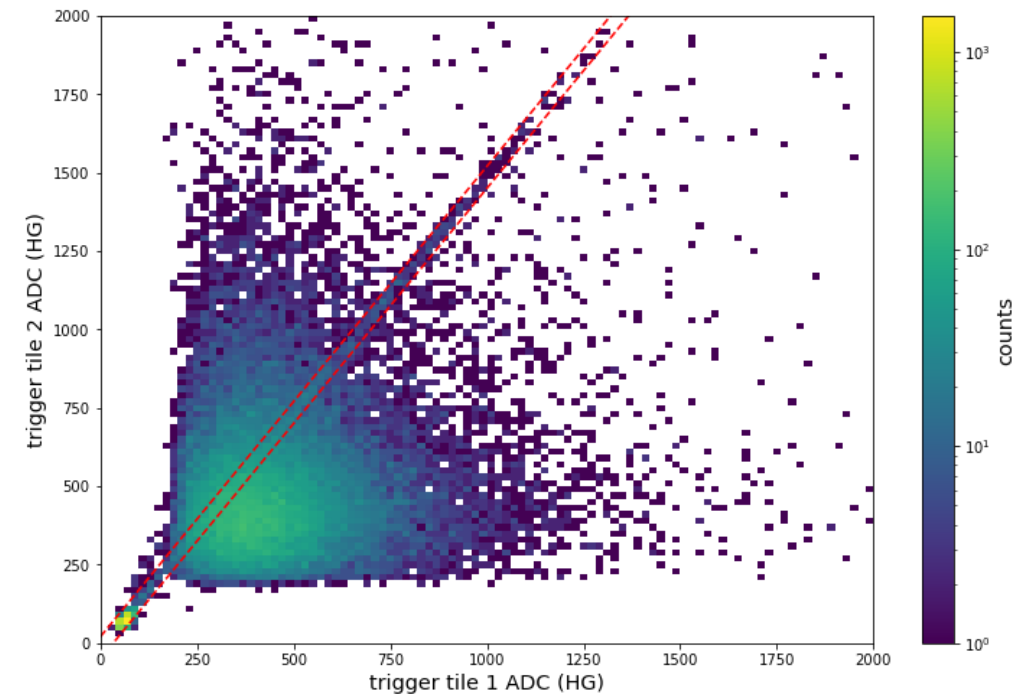
Applying Some Cuts

- Removing first ~5000 triggers

- Removing correlation corridor

- Only using central 60% of trigger tile event
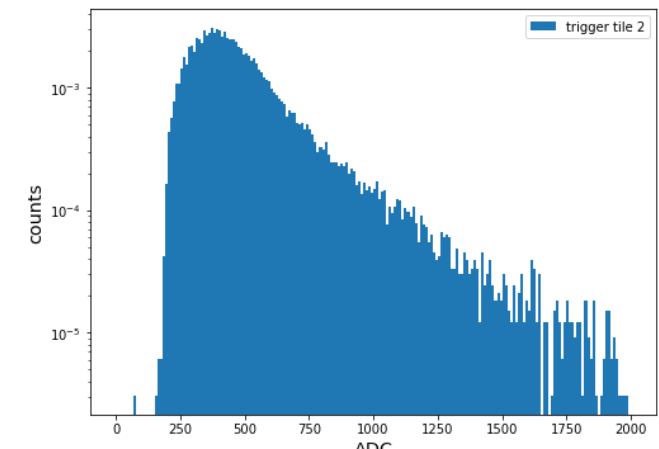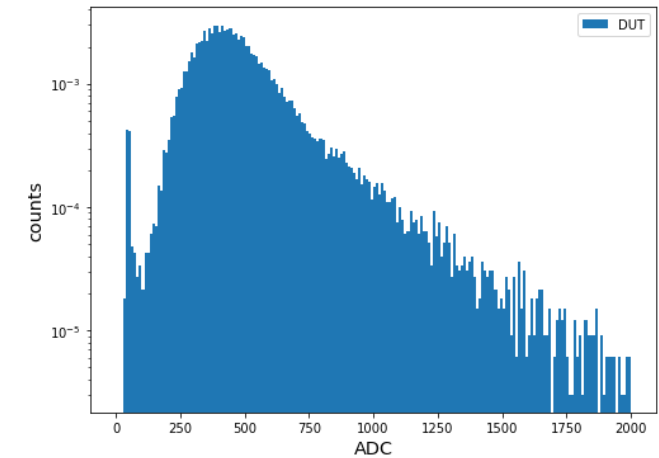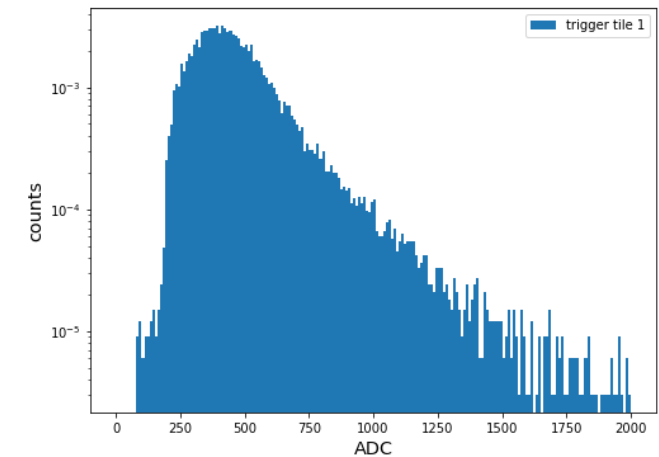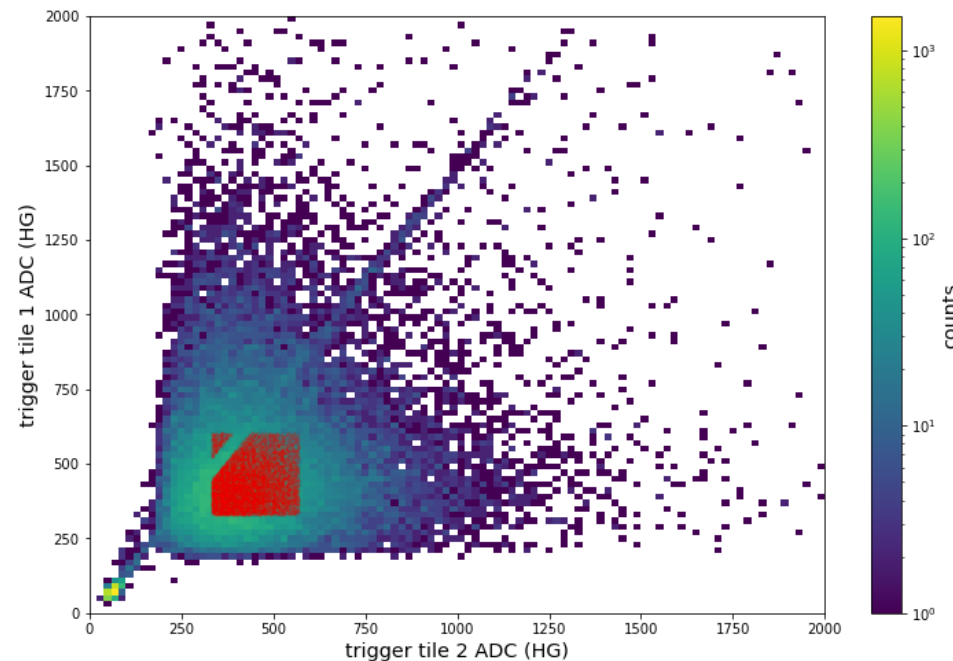
Applying Some Cuts

- DUT efficiency: 99.56% (+- 0.05%)

- Remaining 0.5% easily attributed to coincident hits of two cosmics (showers etc.)

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Summary

- None of this is new or unexpected in principle

- DT5202 has some quirks – as every readout system ever

- Yale, DESY etc. are doing this with a ^{90}Sr source
  - Our local ^{90}Sr source is not currently available, trying to get one from a different group
  - Tried with ^{207}Bi, but does not work at all…

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