Summing tests

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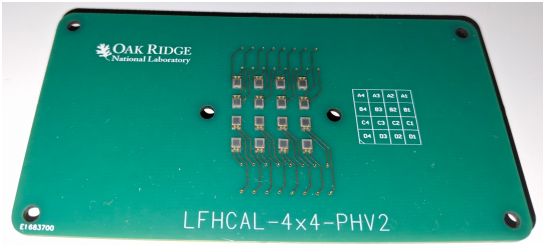
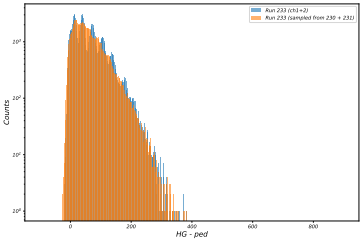
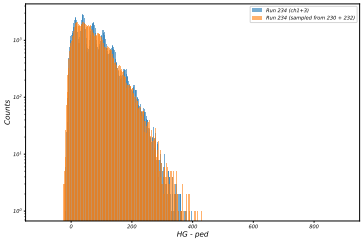
Summing test setup

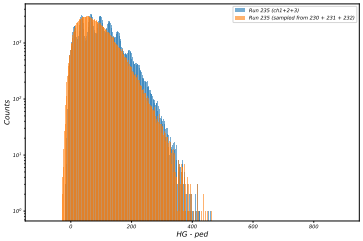


- 2 Component test setup:
  a) Switchable passive summing board
  b) SiPM carrier board (can be exchanged for different SiPM types)
- LED light source + pulse generator used as signal source
- Read-out with CAEN or HGCROC
- For 1.3mm SiPM carrier board up to 8 SiPMs summable (top or bottom rows)
- Caveat: Light intensity & gain not necessarily exactly the same for all SiPMs on board

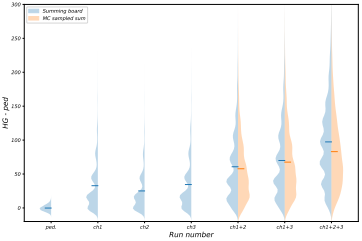
CAEN results



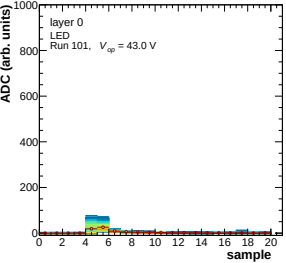


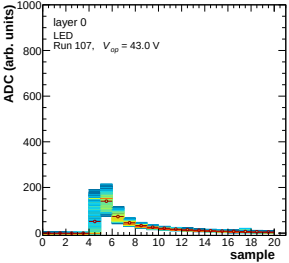


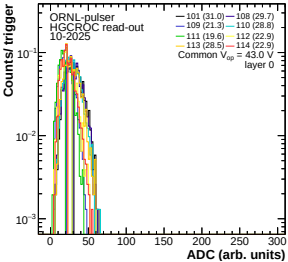
- 3 test cases:
  a) channel 1+2
  b) channel 1+3
  c) channel 1+2+3
- Simple summing of individual SiPMs signals wouldn't necessarily give correct answer due to different LED intensity on individual SiPMs
- Simulated summed signal using individual SiPM measurements and random draw from those
- Reasonable agreement between measured (blue) and simulated distribution (blue)

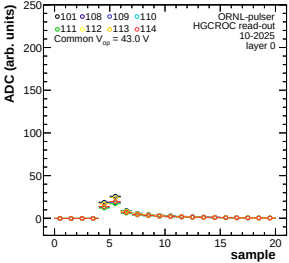


HGCROC results (1)

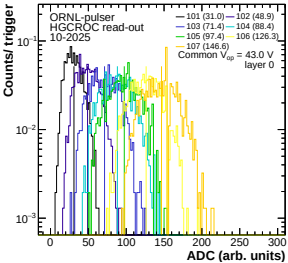


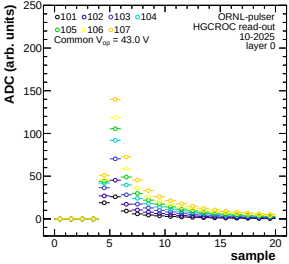






- Runs 101, 108-114 individual SiPM runs
- Runs 102 - 107 adding for each run 1 SiPM
- Small differences in each SiPM response (amplitude) → simple sum not 100% valid but good first approximation
- Signal shape very similar between different SiPMs, seems to primarily scale in amplitude when summing
- Small differences visible for summed signal shape on sample basis





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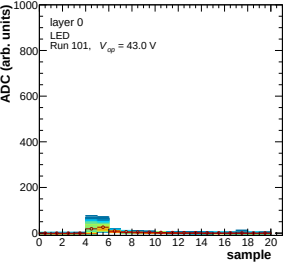

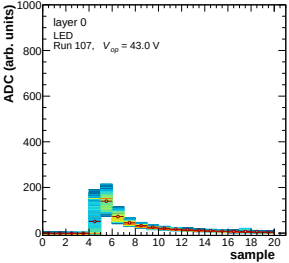

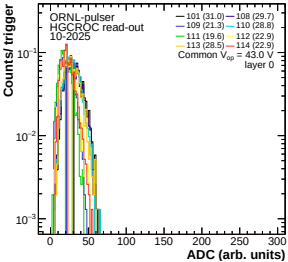

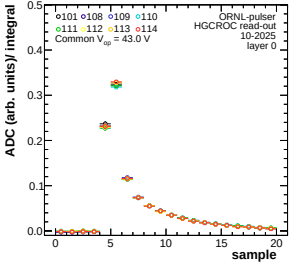

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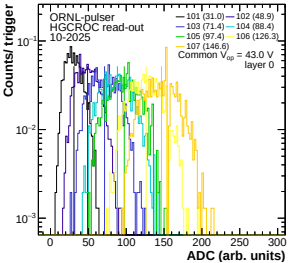

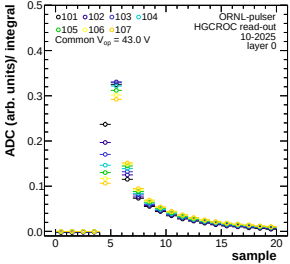

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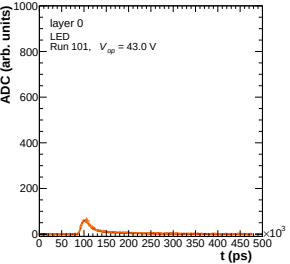

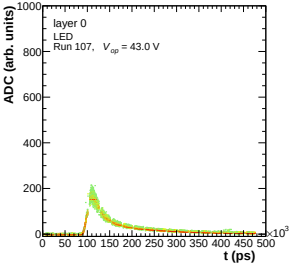

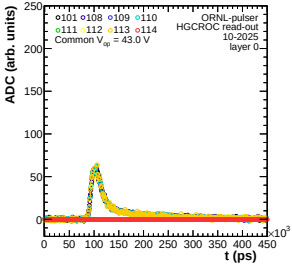

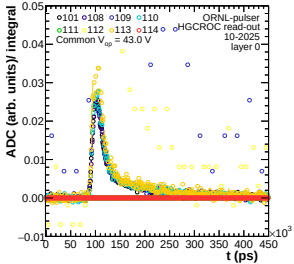

- Similar statements as before remain when looking at toa corrected signal shape
- Some problems with ToA for later runs
- **Summary:** Lets go forward with the passive summing board for the 1.3mm SiPMs, need to test for 3mm SiPMs too