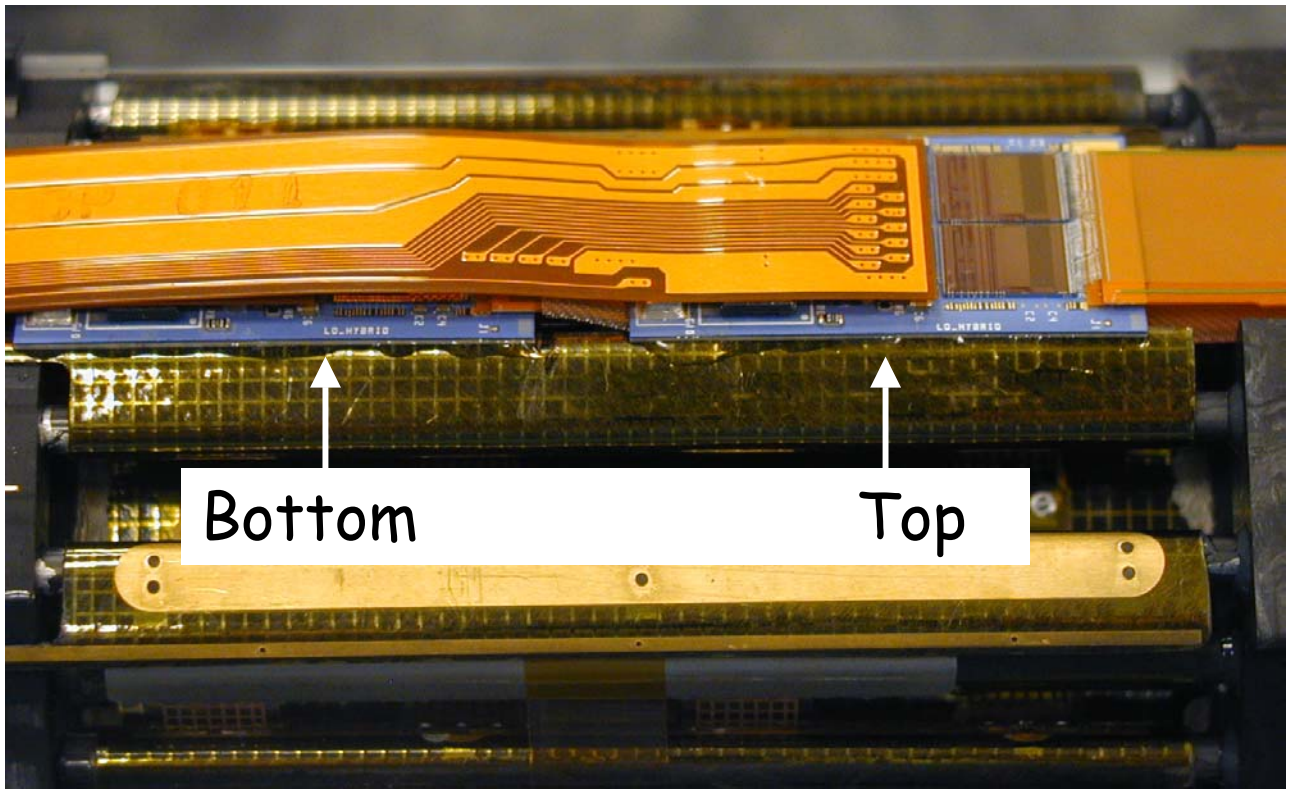
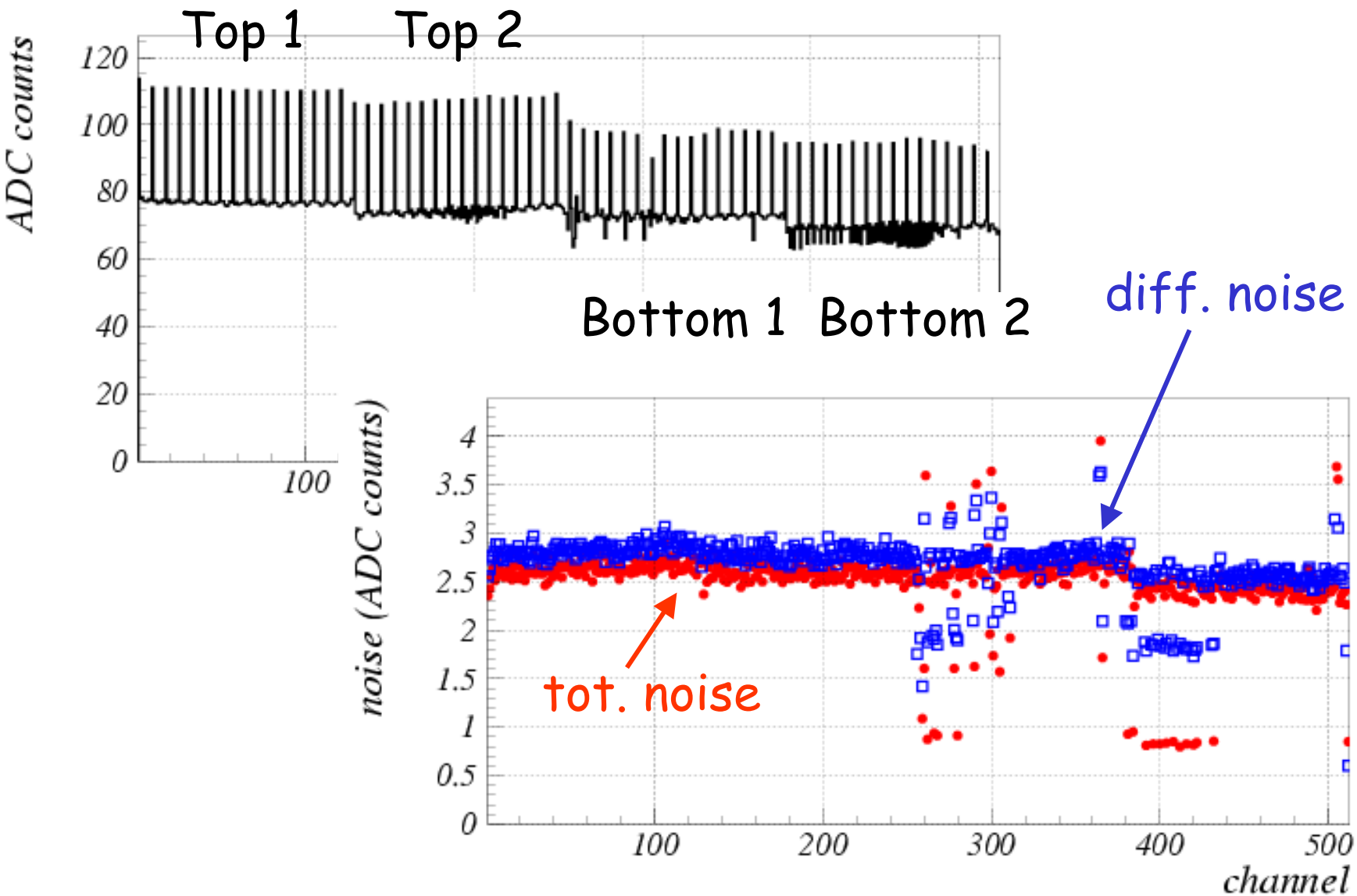
More Spacer Study

- Test done with two modules installed on Sector-B of the old Run IIb support structure

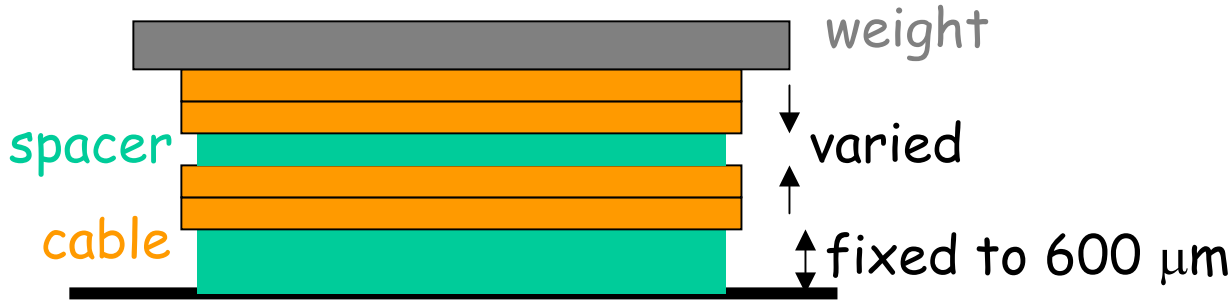


Default (=no weight)



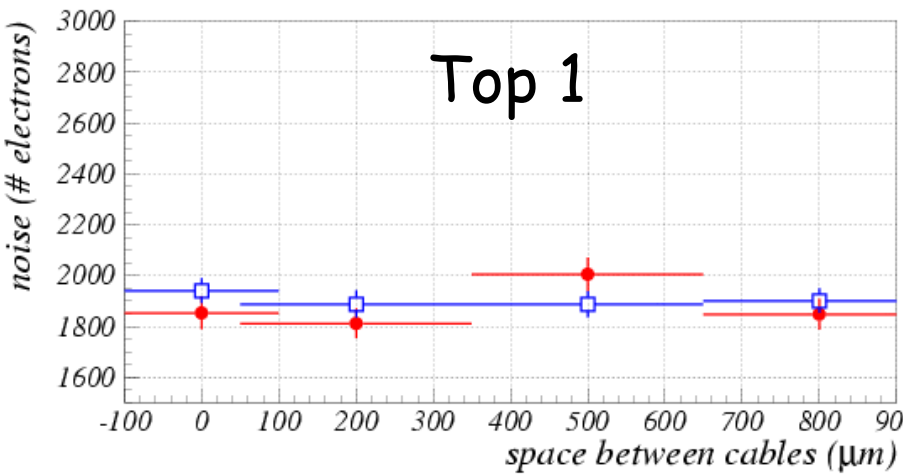
Setup

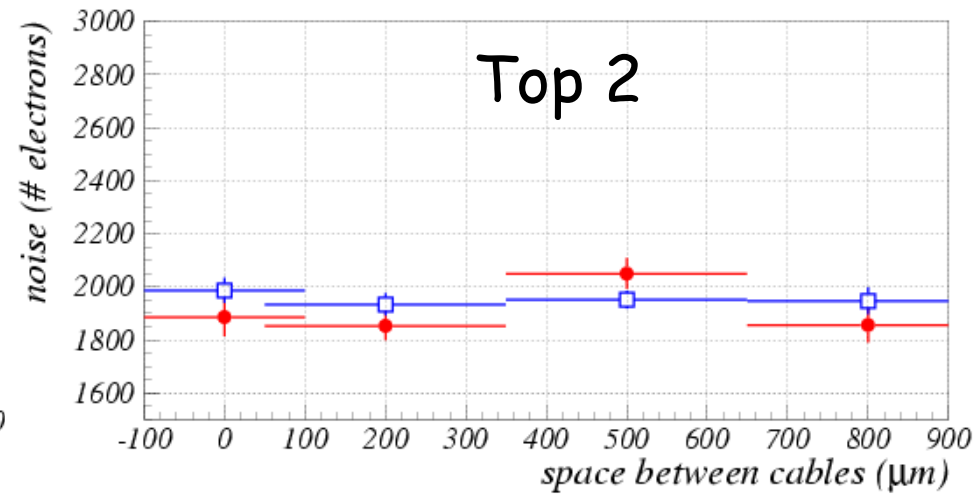
- Calibrate gain for EACH MEASUREMENT
  - Fit with Gaussian to find the peak ← less influence from noisy channels
  - Assume Q = 25fF x 146 mV (V_cal measured) ➔ G = Q (#electrons) /ADC counts
- Noise = RMS of pedestal (ADC x G): the unit is in #electrons
- Fix the distance between the support structure and "bottom" module (600 μm polypropylene mesh)
- See the noise dependence on the spacer thickness between "top" and "bottom" modules

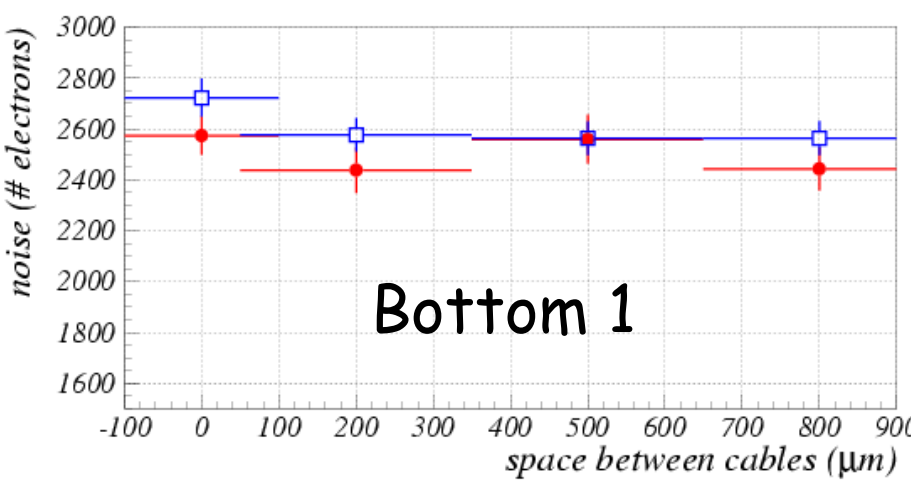


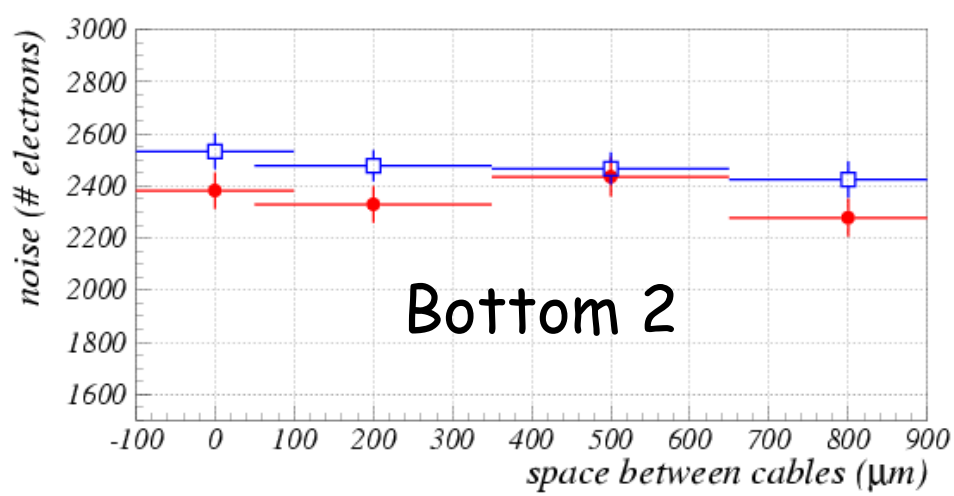
Result

tot. noise
diff. noise









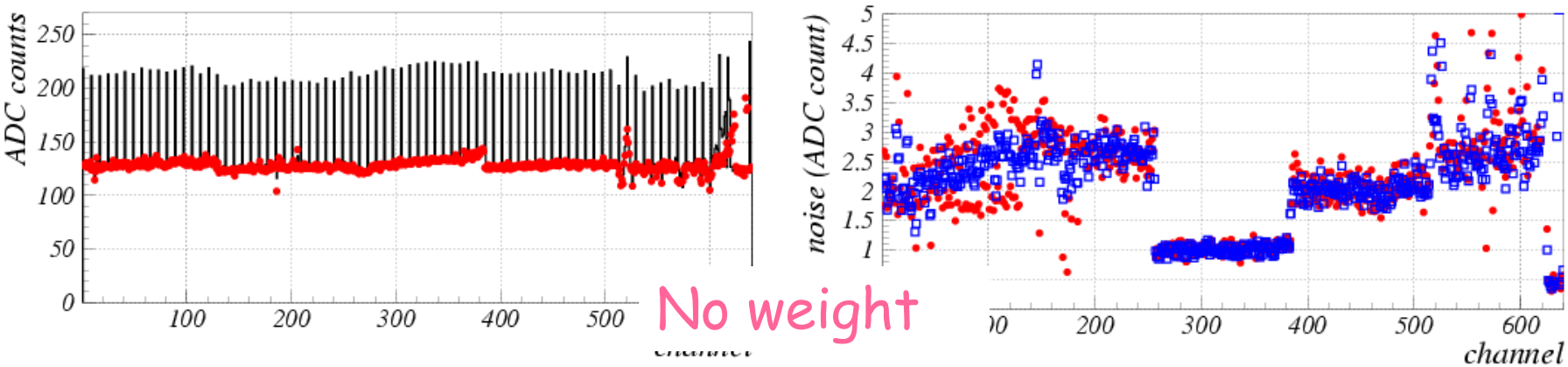
Comments

- No obvious dependence of total noise
- There could be veryyyy small (< 2-3 percent) effect on differential noise
  - 20% increase with $\varepsilon = 2$, no increase with $\varepsilon = 1$ in calculations (ε = dielectric constant of spacer)

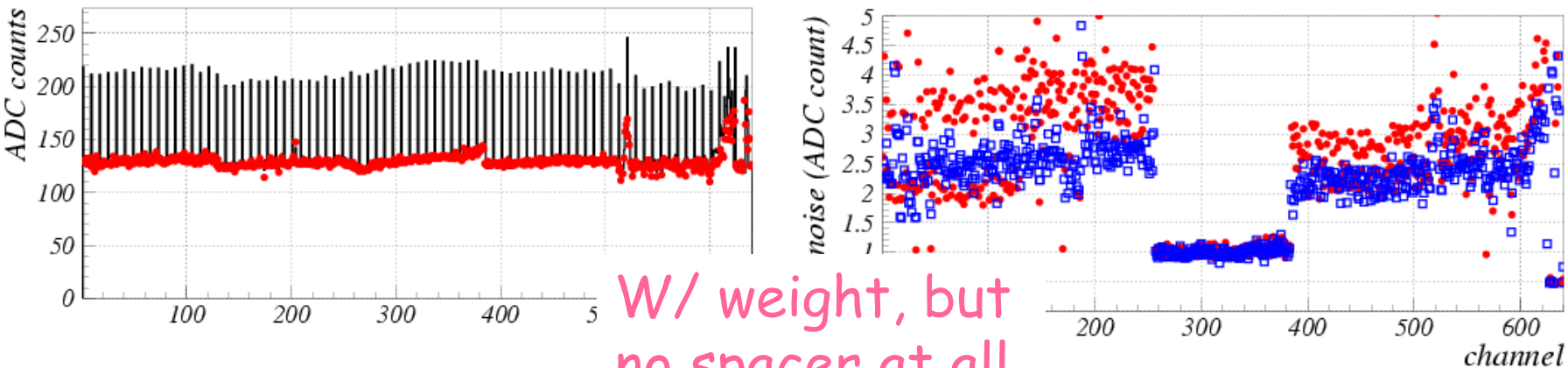
- Worries
  - Bottom module has smaller gain (#electrons/ADC), implying quite high noise
    - No pick up, but large capacitive coupling to somewhere (= support structure)???
  - Quite large pick-up time to time with unknown reason

Bare Module (very old 10 chip)

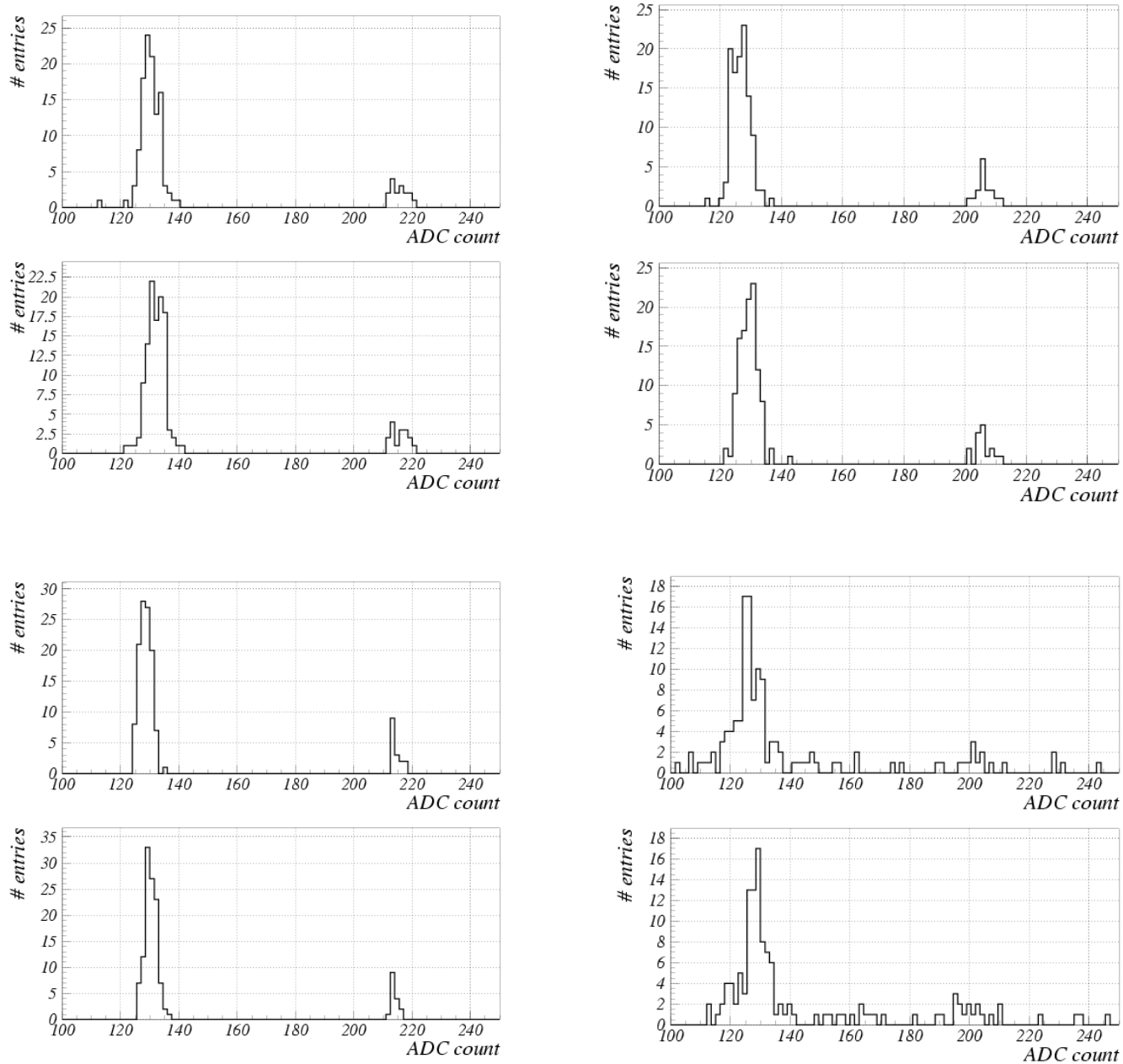
- The same as old conclusion
  - No change in gain
  - Total noise increases in case no spacer between the bottom cable and ground plane (=support structure)



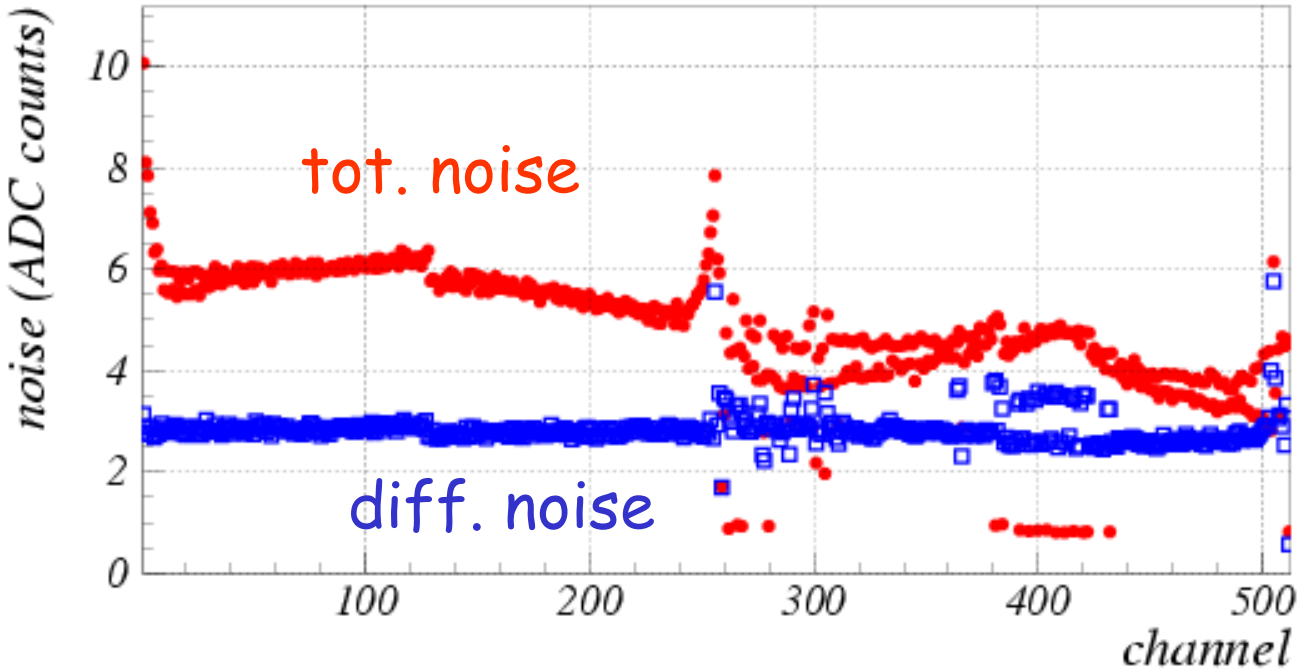
No weight



W/ weight, but no spacer at all


entries
ADC count

Large pick-up



- This is typical of pick-up
  - Higher total noise compared to differential
  - Edge effect