ePIC Jan. 2026 Coll. Meeting - CALOROC Workfest/BHCal

Wednesday, 1/21/2026 @ 8am - 12pm

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Georgia State University

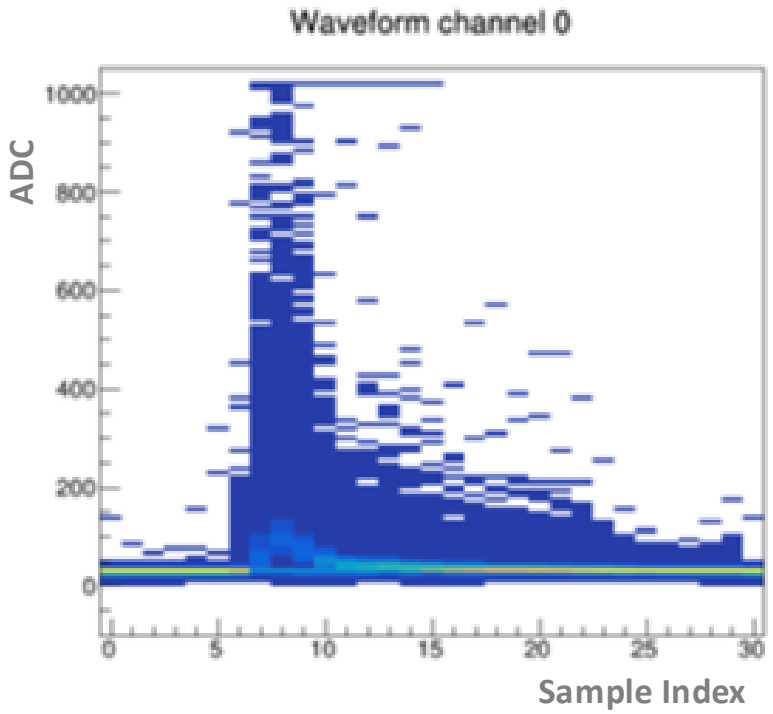
1. What is the capacitance of the detector per channel? (pF)
   530 pF per channel (Hamamatsu data sheet for S14160-3015PS 3mmx3mm SiPM).

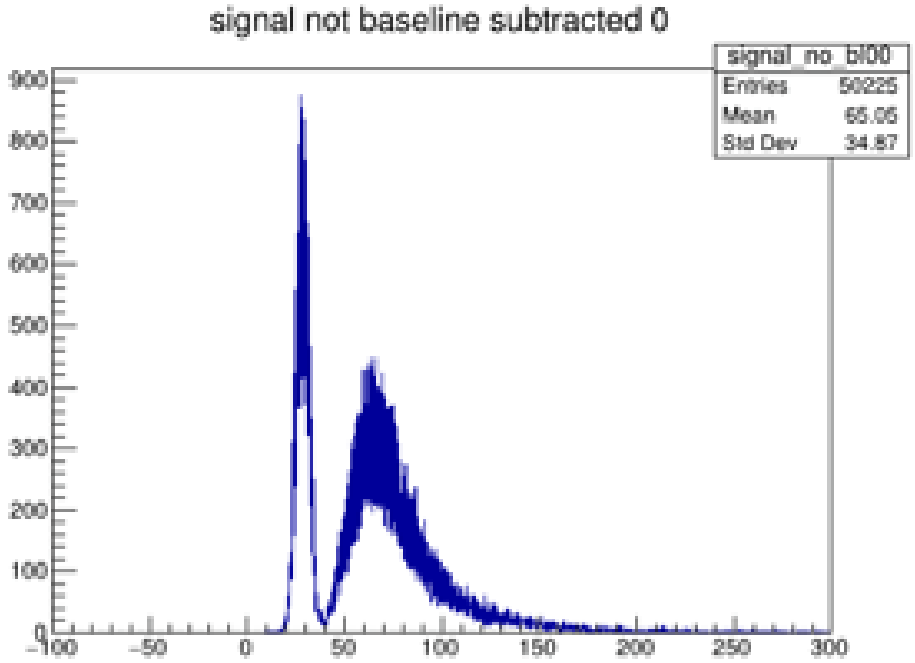
2. What is the lowest signal measurement required? (fC)
   MIP energy deposition per tile : ~1.4 MeV
   Based on existing sPHENIX/OHCal the expected number of fired pixels per MIP: ~50.
   SiPM gain: 3.6×10^5 → charge per pixel ~58 fC.
   ⇒ Total charge for 1 MIP: ~2–3 pC.
   Lowest practical signal (below MIP, e.g., for cosmics or thresholds): ~0.1 MIP → ~200–300 fC

3. What is the highest signal measurement required? (fC)
   Assuming 10 GeV max and based on previous estimates: 2000 fC

4. Do you have a measurement with certain settings of MIP peak, other fixed signal? (With the H2GCROC and settings)

Cosmic data for the 4-tile stack + Hamamatsu-S14160-3015PS (3x3)+H2GCROC. Integrate over channels 6 through 10. Not baseline-corrected data.





5. What is the charge resolution requirements? (Percentage as a function of charge, not in bits)

Resolution due fluctuations is for minimum: sigma_Q/Q ~ 45% and maximum: sigma_Q/Q ~ 1%. However, the BHCal resolution ~70%. There are ongoing ML efforts to improve the resolution. So, for now ~50%.

6. What is your timing requirements/measurements?

Ongoing studies

7. What is the expected occupancy per channel from simulation? (Including full background)

Low? (lower than in HI; in sPHENIX 100%) but have DIS simulation samples; need to analyze.

8. What is the maximum hit rate per channels needed if all channels are activated at the same time?

Plans to perform studies.

9. What is the expected dark noise rate?

Dependent on the leakage current that increases as the device is exposed to neutron damage ➔ Study of dark current as a function of neutron fluence

Hamamatsu

Type no.	Dark count rate*5 DCR	
	typ. (kcps)	max. (kcps)
S14160-3015PS	700	2100

10. What is the maximum hit rate required for a single channel? (If only one receives signal)

Plans to perform studies.

11. What is the double pulse separation needed? Overlap signals from two independent bunch crossings? (This affects small or large signals differently in your detector?)

Plans to perform studies.

12. How many number of samples you require as minimum (max is 7 now in CALOROC)?

12 samples. This implies one additional bit, leading to a preferred maximum of 16 samples.

13. What is the preference for A or B for CALOROC?

B, provided it performs as expected.