LAr R&D Progress Updates 05/14/26

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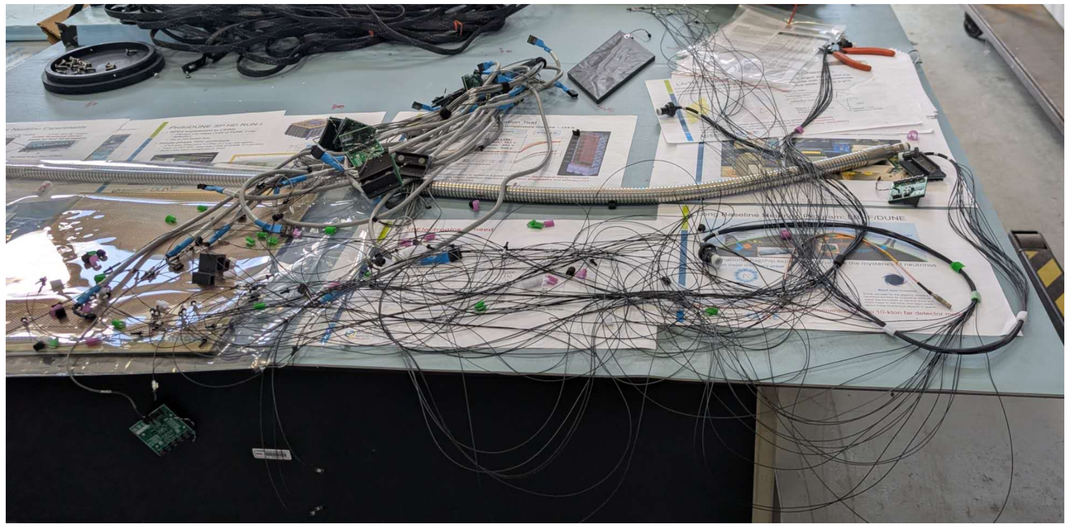
Brookhaven National Laboratory

Lab Safety and Space Management

- 6000-gallon LN2 refill ordered
- Site wise power outage on 05/06 at 10:32am
  - Caused by fallen branches
  - PSEG came on site cleaned up the branches
  - Considered as force majeure by PSEG

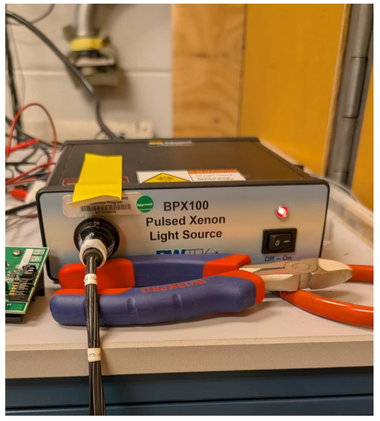
SiPM measurement setup

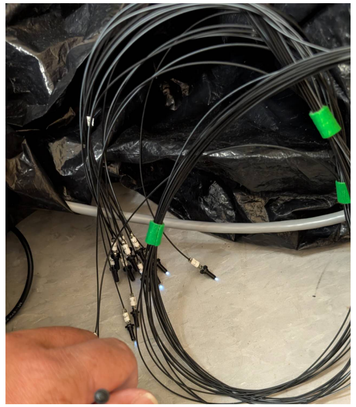
- sPHENIX prototype fiber bundles
  - SPHENIX protoype has fiber 4x bundles with 17 fibers each
  - Useful for the filter multiple SiPM calibration
  - Detangled the bundles
  - Used for SPE measurement with the SiPM

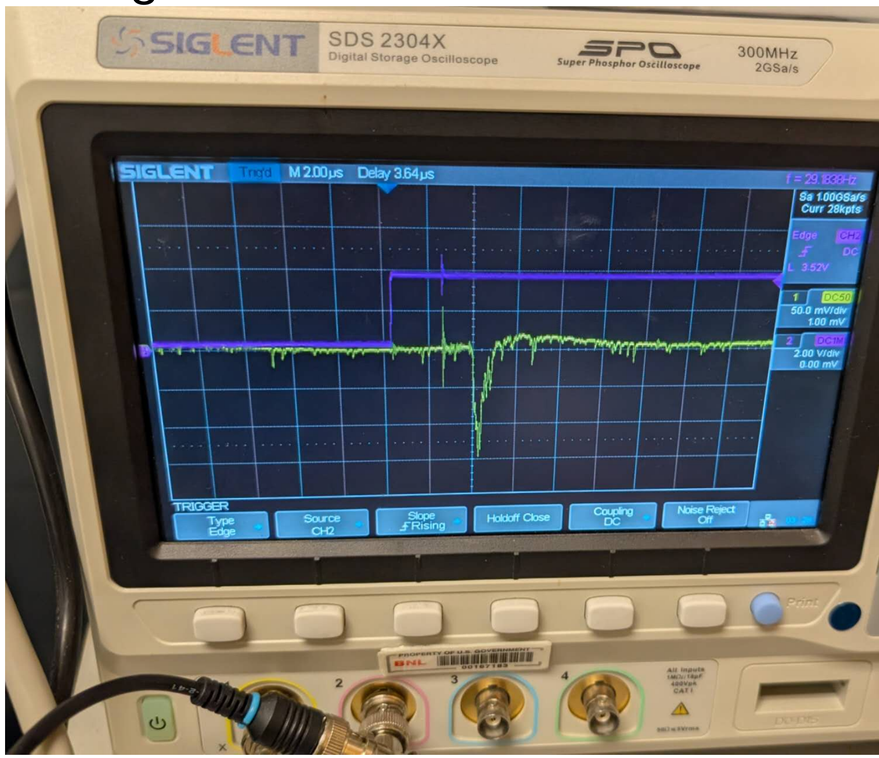


SPE measurement with Xenon Lamp

- One of the bundle was used with our Xenon lamp for SiPM measurement with S12572-015 sPhenix SiPM
  - Only one single fiber used
  - The SiPM is mounted on one of the scintillation panel of for optical mount
  - The light intensity is too high, tried to attenuate by pull off the fiber
  - The pick up noise from the Xenon lamp overwhelmed the single photon signal
  - Need a quieter light source

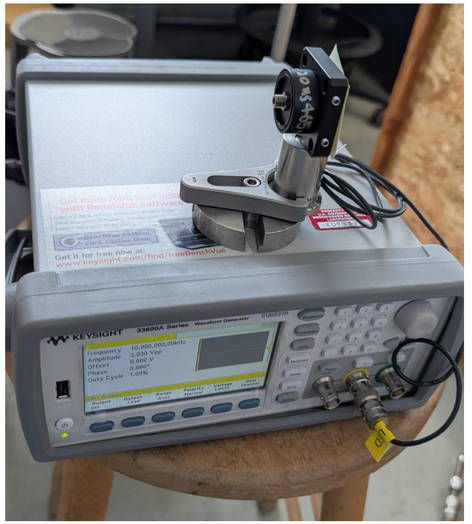


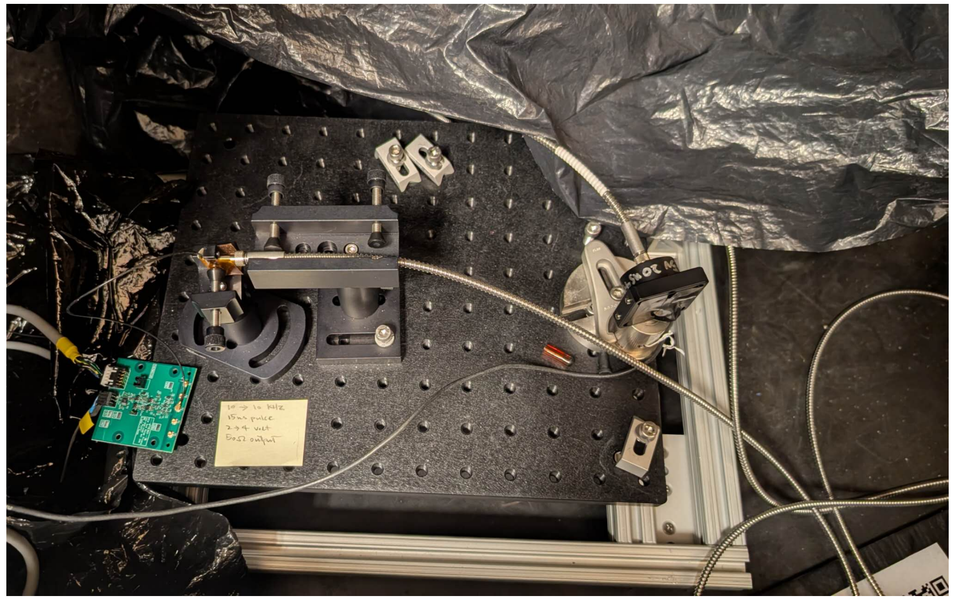


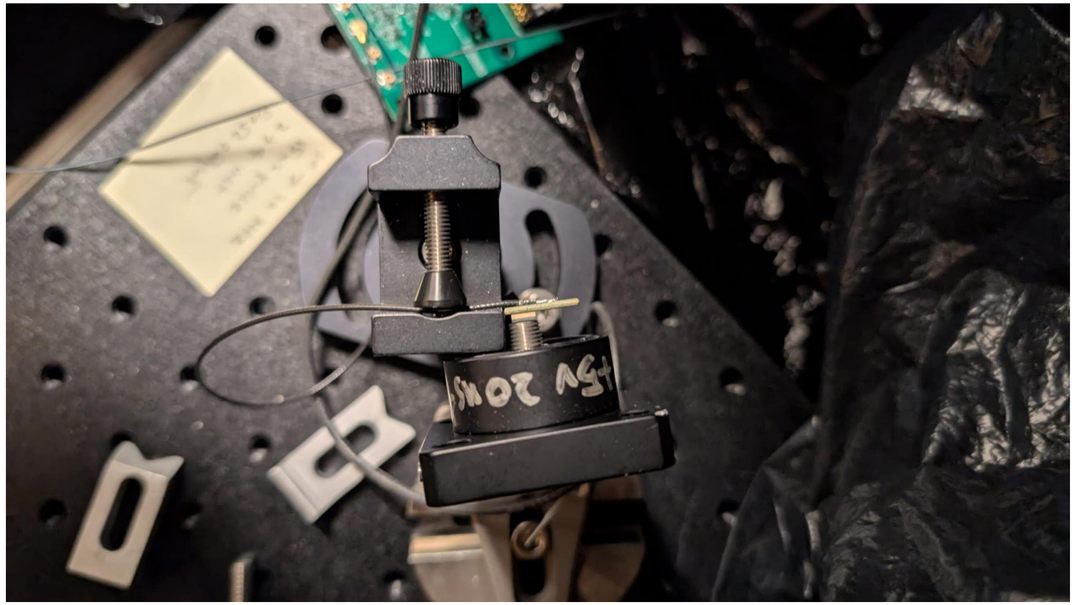


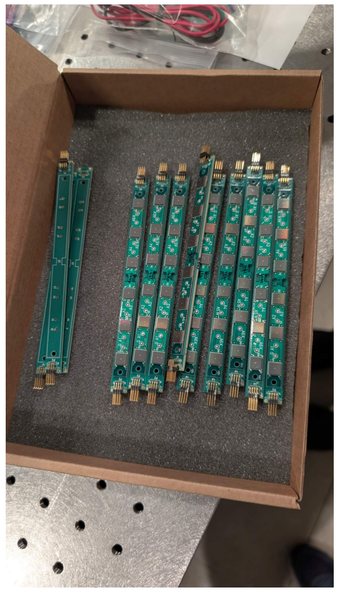
SPE measurement with LED

- Borrowed a blue LED with 465nm wavelength from Thomas
  - The LED is driven by 15ns width pulse with 2-4 Volt bias, 10-10kHz
  - Get a pulser from Shanshan
  - Setup on an optical breadboard
  - The fiber coupling to the SiPM does not work(Not signal with the fiber)
  - Direct coupling used instead
- Thomas also have a few identical SiPMs like CIEMAT had



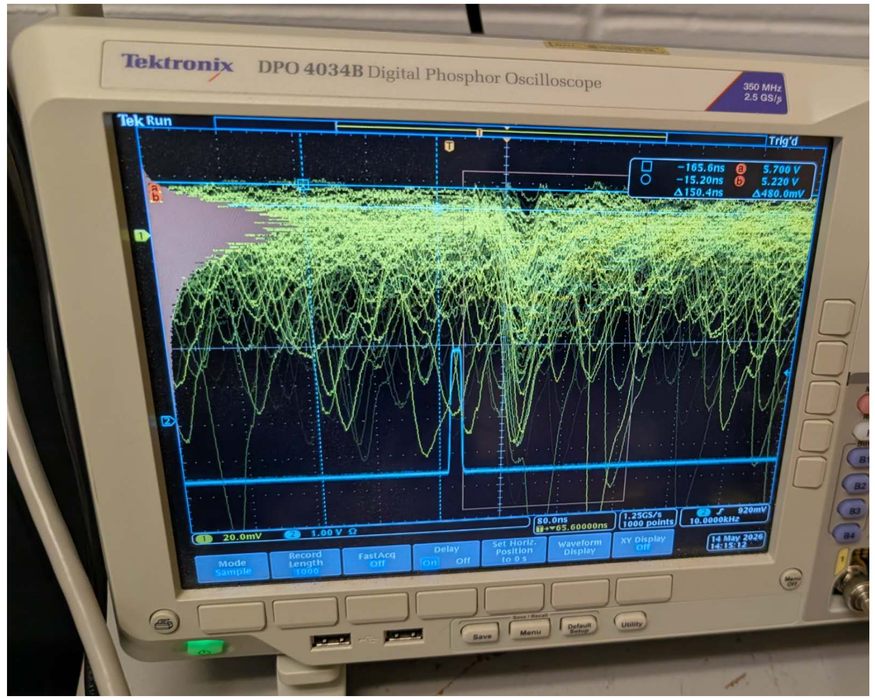


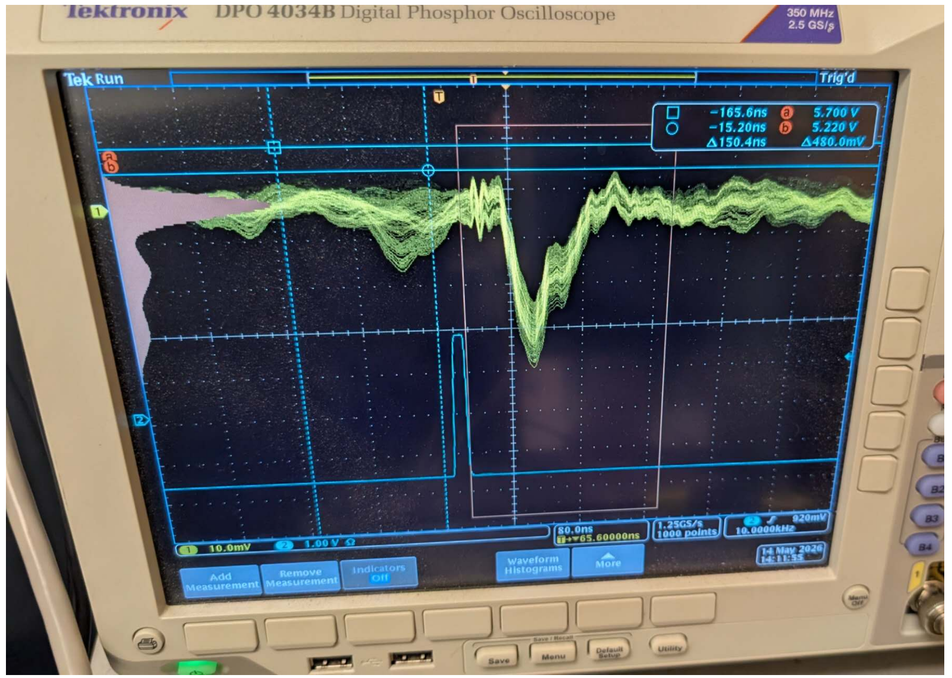




SPE measurement with LED

- S12572-015 sPhenix SiPM signals
  - LED signal visible with direct coupling
  - The single photo signal appears but smeared due to noise(both baseline shifting and running noise)
  - The single phone peaks appears after averaging
  - Need to troubleshooting to reduce the noise
  - Will try the VUV SiPMs later





Plan for the summer students

- Given we have two students, there are two topics they can work on
  - Light measurement with the SiPM setup
    - SiPM study with performance characteristic, gain calibration
    - Setup to test the conception of side readout on the pTP filter with SiPM
      - Construction of the setup with 3D printing(CE team just got a new 3D printer)
      - Data analysis of the SiPM data
    - Spectrum/Filter thickness measurement on demand from SBU group
  - LAr Test Stand
    - Upgrade the inline filter with more filter materials
      - New filter assembly, plumbing, leak check, activation
      - Cryogenic fill with Purity Monitor Measurement
      - Daily cryogenic operation practise
    - Xenon collection and transfer
- I will talk to the students next Monday at 10am