

LAr R&D Progress Updates

07/02/26

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Lab Safety and Space Management

- Accident onsite 07/01
 - A summer intern student involved into an accident with lab forklift when crossing the road
 - The injured student was moved to SBU hospital with helicopter
 - Lab is on safety pause until noon of next Monday
 - Please be careful when working in the lab
 - Safety is always the priority
- EEI inspection
 - Conduct EEI inspection on two devices for the setup we are taken
- Highbay HVAC was just fixed before the heat wave

Measurement taken last week

- Prototype 3D printing design and printing
 - Updated version with additional SiPM holder for transmitted light
 - Mocking assembly with filter and SiPMs in place
- Xenon collection assembly
 - Leak checked to great vacuum tightness, much lower than 1.0×10^{-9} mbar.l/s
 - Heating tape wrapped on the plumbing
 - Start of baking postponed to next week due to the safety pause

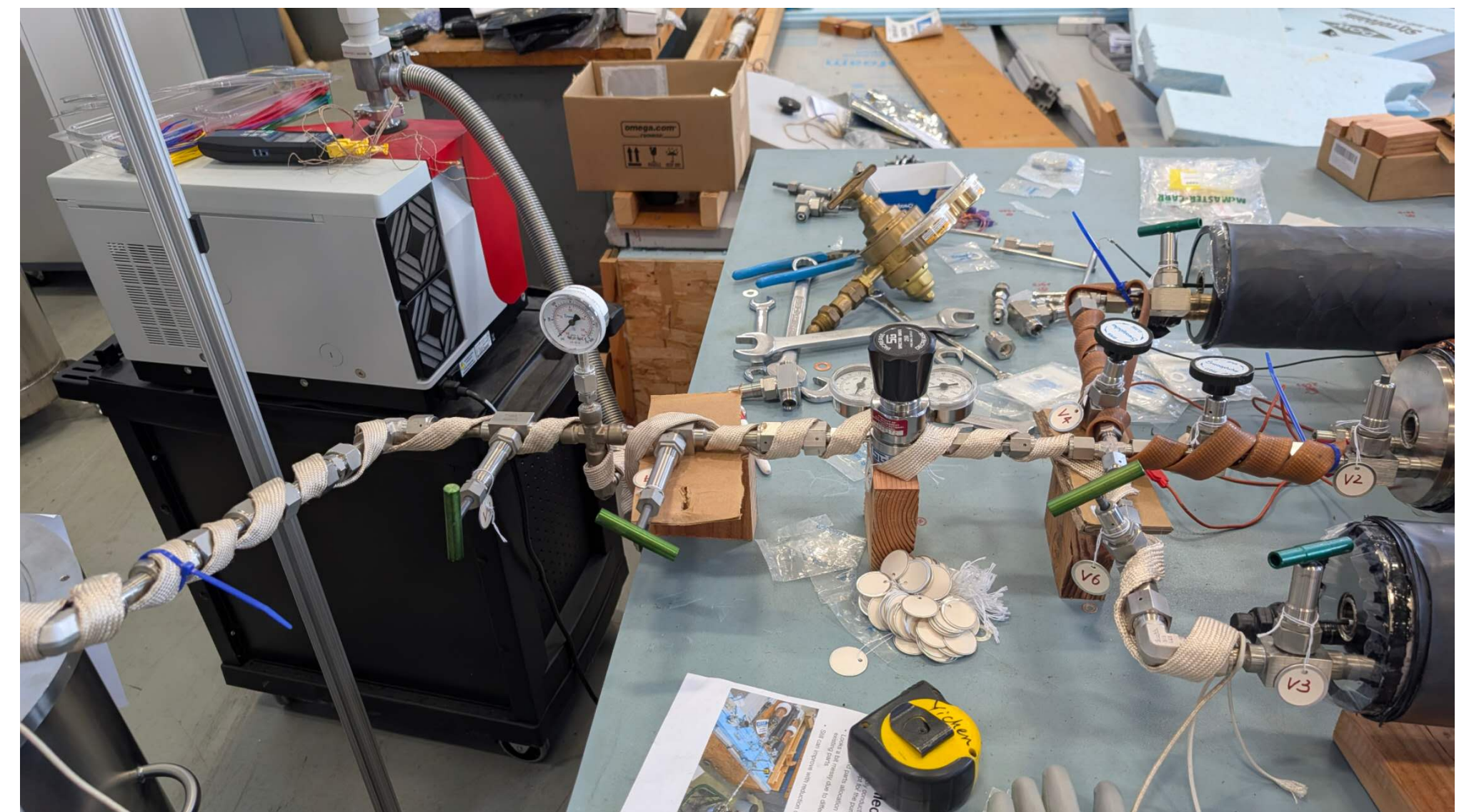
Prototype with 3D printing

- A prototype made by 3D printing
 - Filter held in place in groove
 - Slots on the side for SiPMs mount against the side surface of the filter
 - Light measurement TBD



Xenon collection system leak check

- The plumbing
 - All the plumbing done by Henry and Amoggh
 - Aleksey came over and went through the setup, will get his help for the first run
 - In the progress of property transfer under my name
 - Standard helium detector procedure
 - Very good leak tightness after fixing the initial gross leaks
 - All valves are labeled
 - SOP and Work Permit application sent to the safety, review arrangement in progress



Plan for summer intern students

Photon Detection System Development and Optical Characterization

Project Goals

- Characterize pTP wavelength-shifting (WLS) filters for PDS applications.
- Calibrate and evaluate VUV SiPM performance.
- Develop a prototype optical detector assembly.

Major Tasks

1. pTP Filter Characterization

- Complete measurements of remaining pTP filter samples.
- Study effects of:
 - Filter thickness
 - Manufacturing variations with longer scanning distance
- Evaluate coating conditions
- Comparison measurement with SBU samples
- Quantum yield measurement
- Transmission measurement

2. VUV SiPM Characterization

- Single Photoelectron (SPE) measurements using oscilloscope.
- Gain calibration and breakdown voltage determination.
- Gain vs. Overvoltage.

3. Detector Prototype Development

- CAD design and 3D printing (PLA prototype).
- Assembly of:
 - Filter mount
 - SiPM holder
 - Detector base
- Mechanical integration testing.

4. Optical Studies

- Investigation of Total Internal Reflection (TIR) effect
- Angular response measurements.
- Relative light collection efficiency measurements.

5. Monochromator Measurements

- Debris sample expected from Yimin

Deliverables

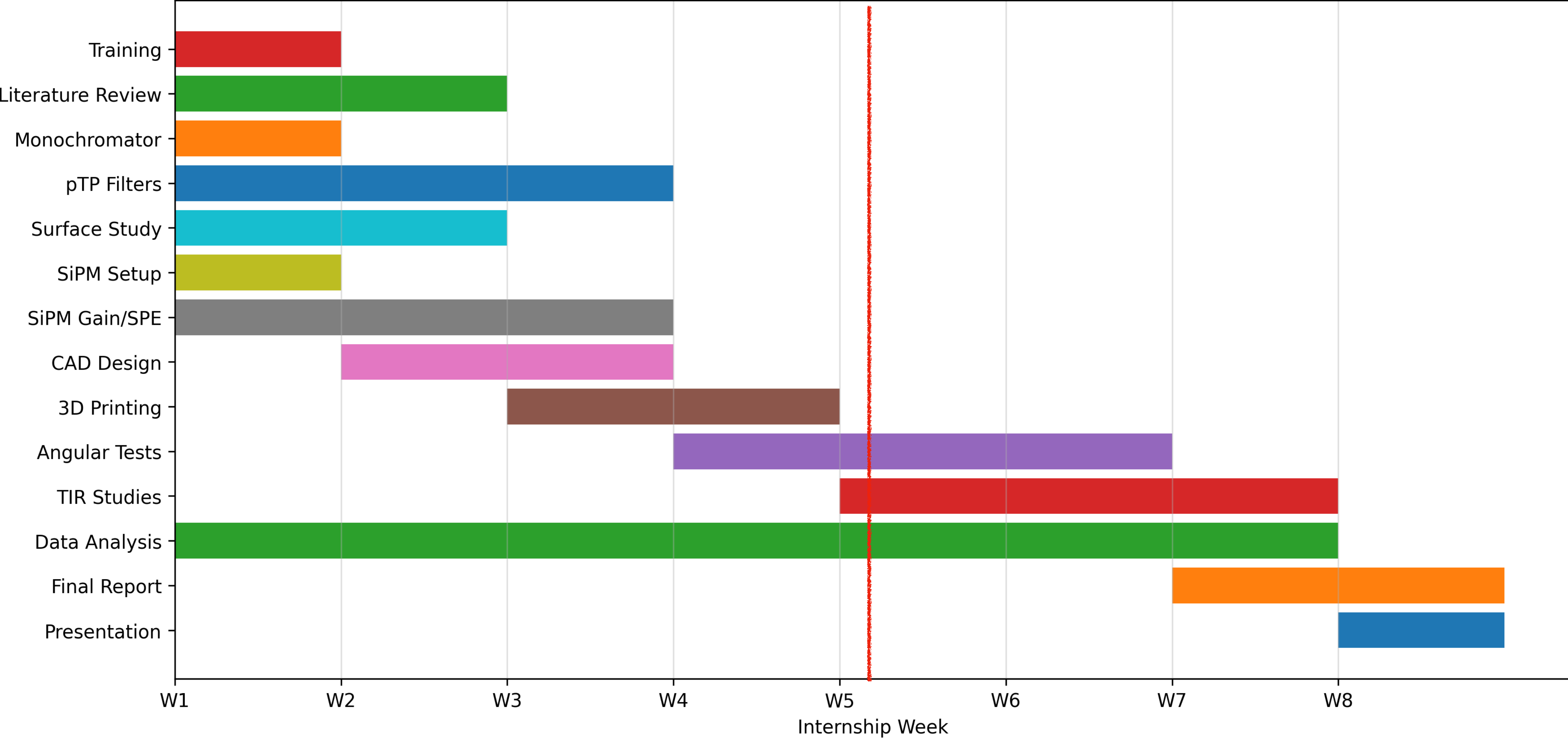
- Complete pTP filter performance database.
- SiPM calibration and SPE analysis package.
- Prototype detector assembly.
- Final technical report(tentative):
"Characterization of pTP Filters and VUV SiPMs for Photon Detection Systems"

Skills Gained

- ✓ Optical measurements
- ✓ SiPM characterization
- ✓ Data analysis
- ✓ Mechanical design & 3D printing
- ✓ Detector instrumentation: spectrometer, profilometer, oscilloscope and etc.

Photon Detection System Development and Optical Characterization Plan

PDS Summer Intern Project Timeline (8 Weeks)



Plan for summer intern students

LAr Stand and Xenon Collection System Project

Cryogenic Operations, Xenon Collection, and Purity Monitoring

Project Goals

- Gain hands-on experience with liquid argon cryogenic systems.
- Support xenon collection and cryogenic operations.
- Construct and commission Xenon collection system
- Operation of cryogenic system

Major Tasks

1. Xenon Collection System

- Study system design and operation.
- Participate in system construction
 - Cryogenic plumbing
 - Leak check
 - Gas handling
 - Hardware installation
- Monitor xenon recovery performance.

2. Cryogenic Hardware & Controls

- Learn detector support infrastructure.
- Work with sensors, instrumentation, and controls.
- Introduction to LabVIEW monitoring and operation.

3. Inline Filter Construction

- Assemble new inline filter
- Leak checking and validation.
- Activation and commissioning procedures.

4. LAr Filling and Purity Measurements

- Liquid argon fills.
- Monitor purity evolution and system performance.
- Analyze purity-monitor data.

Deliverables

- Xenon collection performance assessment.
Commissioned inline filter system.
- Purity measurement dataset and analysis.
- Final technical report:
"Commissioning and Performance Evaluation of the Xenon Collection System"

Skills Gained

- ✓ Cryogenic operations
- ✓ Vacuum and gas systems
- ✓ Detector support systems
- ✓ Hardware assembly and troubleshooting
- ✓ LabVIEW controls
- ✓ Experimental data analysis

I Ar Stand and Xenon Collection System Project Plan

LAr / Xenon Collection Intern Project Timeline (10 Weeks)

