LD2614: Development of a Sub-100 ps MPGD-Based TOF Detector for High-Energy Neutrons at JLab and EIC

LD2614 (MPGD-nTOF): Q1 Report – February 06, 2026

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U.S. DEPARTMENT OF ENERGY | Office of Science

JSA

LD2614: Progress Report

Refined Simulation of Detector Performance

- 10 cm scintillator – 10% efficiency, 50 ps timing resolution – 529 MeV neutron
- 20 cm scintillator – 20% efficiency, 80 ps timing resolution – 529 MeV neutron

Detector Structure Improvement

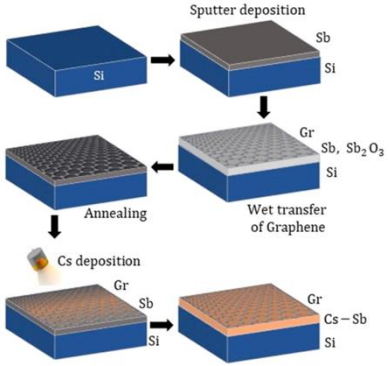
- Suggestions from **Amos Breskin** – Weizmann Institute, Israel – GPD (Gaseous Photomultiplier for UV-Visible range photons)
- Original detector design needs to be improved – in progress

Rearrangement of Milestones

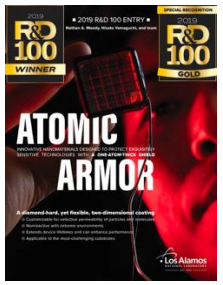
- **Graphene-coated photocathode** is the key for realistic applications in nuclear experiments
- Develop a graphene-coated **K_2CsSb** photocathode in the 1st year
  1. QE measurement
  2. Evaluate robustness under gas environment
- Detector prototype in the 2nd year

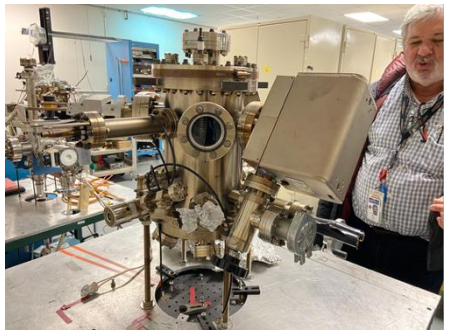
Path Forward

- Scheduled in **April**, grow graphene-coated **K_2CsSb** photocathode in **BNL** – using the published intercalation method
- In-house capability for manufacturing bialkali photocathode/substrate at JLab
  1. **Md. Abdullah Mamun (injector scientist) joined the project**
  2. Refurbish of the vacuum deposition chamber at JLab in progress



Jyoti Biswas, Mengjia Gaowei et. al, APL Mater. 10, 111115 (2022)





- **Potential Challenge:** robustness under gas using this method needs to be tested – suggestions from **Hisato Yamaguchi (LANL)**

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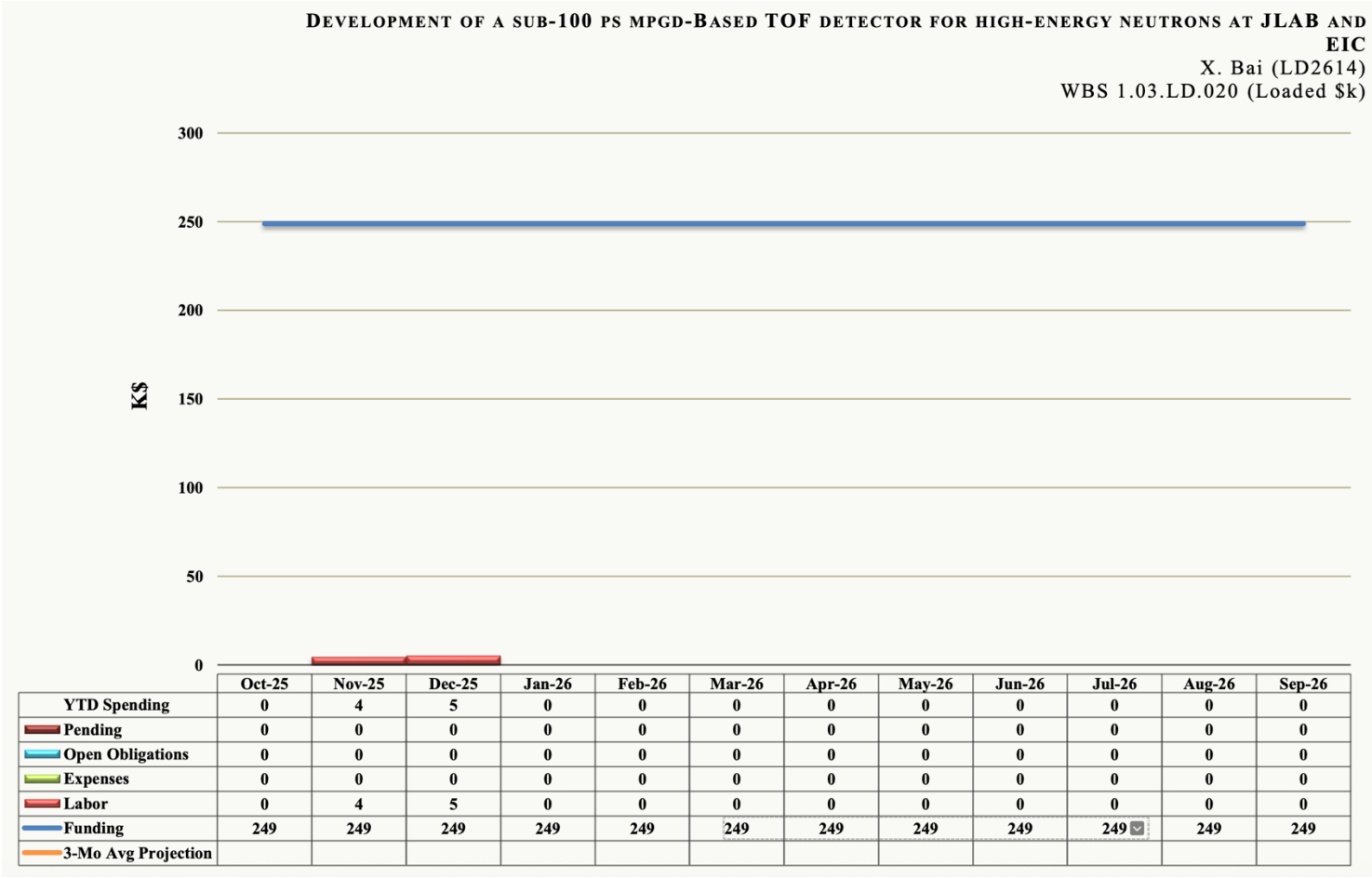
LD2614: SPENDING REPORT

- **Spending to date remains low** – <u>slower spending than scheduled due to delayed start</u>
  1) Nov-Dec expenditures: ~9K total, entirely on labor
  2) Spending expected to accelerate soon, with near-term planned costs of ~**60K** related to refurbishment of vacuum deposition chamber / vacuum suitcase and ~**30K** for detector components



	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26	Apr-26	May-26	Jun-26	Jul-26	Aug-26	Sep-26
YTD Spending	0	4	5	0	0	0	0	0	0	0	0	0
Pending	0	0	0	0	0	0	0	0	0	0	0	0
Open Obligations	0	0	0	0	0	0	0	0	0	0	0	0
Expenses	0	0	0	0	0	0	0	0	0	0	0	0
Labor	0	4	5	0	0	0	0	0	0	0	0	0
Funding	249	249	249	249	249	249	249	249	249	249	249	249
3-Mo Avg Projection												