

LD2309 - Fast Timing Detector based on Resistive Micro Well (μ RWELL-PICOSEC)

Kondo Gnanvo

JLab Radiation Detector and Imaging Group (RD & I Group)

Quarterly Meeting – January 19th, 2023

Wenze Xi, Jack McKisson, Brian Kross

JLab - RD & I Group

Klaus Dehmelt

Stony Brook University

LD203 - μ rPICOSEC R&D Group:

- ❖ Group Indico page: <https://indico.jlab.org/category/28/> - Weekly meeting every Monday at 1pm
- ❖ Group Wiki page: https://wiki.jlab.org/urwell_picosec/index.php/Urwell-picosec
- ❖ Member of CERN MM-PICOSEC collaboration

Design and prototyping effort:

- ❖ Development of single-pad μ rPICOSEC prototype and tested in the GDD lab at CERN, Dec. 2022. ✓
- ❖ Analysis with promising results - **ongoing**
- ❖ Design of μ RWELL PCBs with optimized geometry ✓ procurement of the parts - **ongoing**

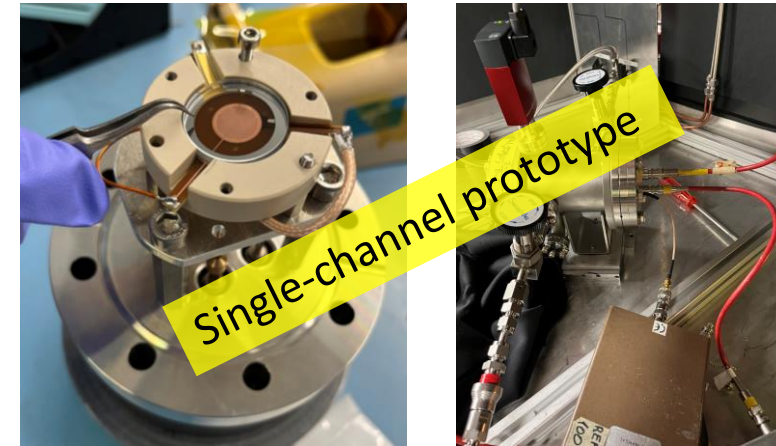
Multi-channel readout electronics and DAQ

- ❖ Test of the single channel fast timing electronic based on programmable differential amplifier (PDA) – Wenze Xi, **ongoing**.
- ❖ Design of the pre-prototype board to test multi-channel fast timing electronics - Jack McKisson, **ongoing**

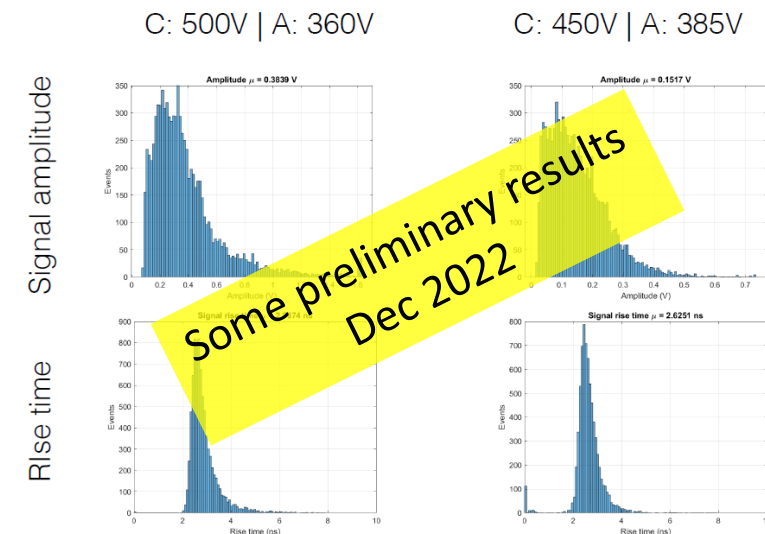
Hiring a postdoctoral research associate

- ❖ Position has been created and advertised. ✓
 - ❖ <https://jefferson-lab.us.hire.com/p/a3328681ebdf46ef89d43c61e6ae4703-ldrd-urpicosec-postdoctoral-fellow>
- ❖ Very few candidates so far have applied ✗
- ❖ Hope for a few more applications → will wait until end January to start candidate selection.

Single-pad **urPICOSEC** in test @ CERN, Dec 2022



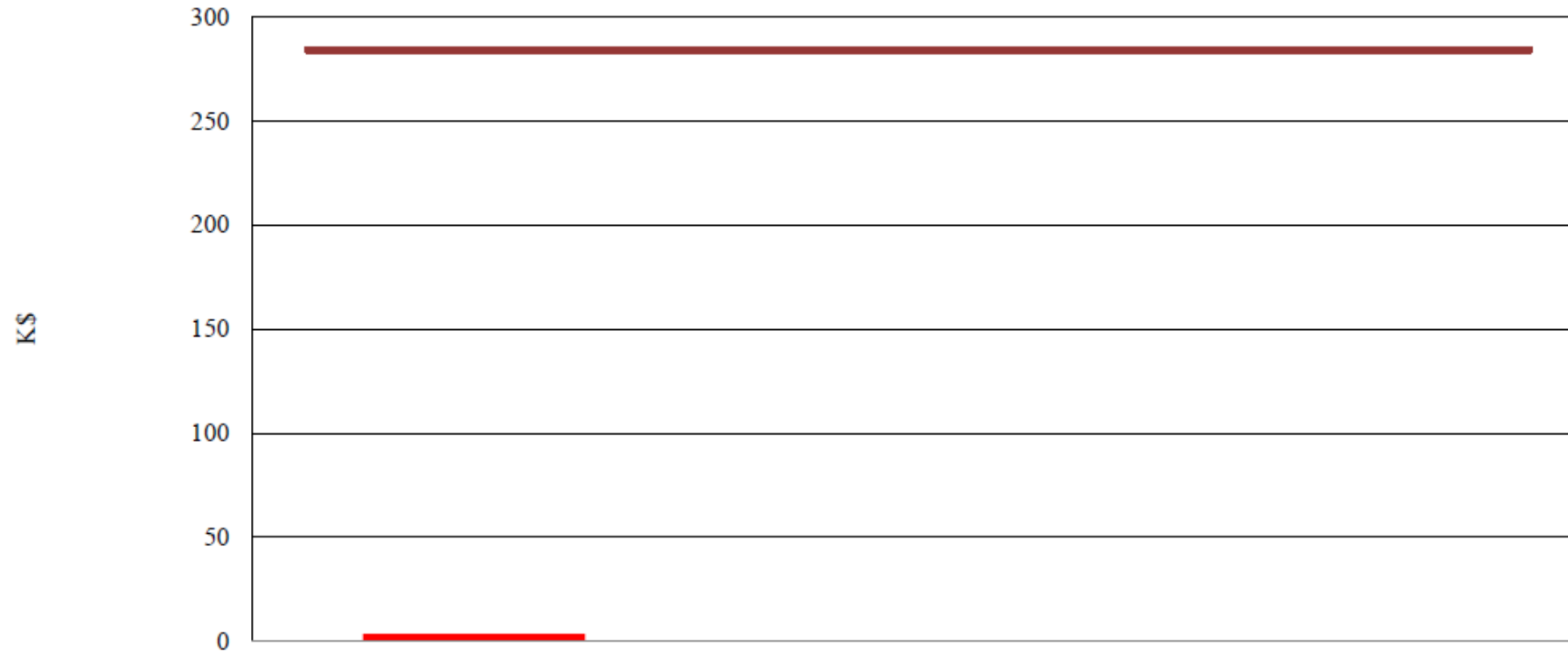
Preliminary results – gain vs. signal arrival time



- 1. Complete the hiring of the postdoctoral research scientist** → ongoing – done by early Q2
 - ❖ Start the candidate interview and select candidate for offer (early Q2)
 - ❖ We are a bit worried by the lack of applications so far → this is our main concern right now
- 2. Studies of the optimization of μ RWELL parameters with single-channel prototypes** → ongoing – completion Q3
 - ❖ Procurement of several single-channels prototypes with different holes geometry (started Q1 - Q2)
 - ❖ Test of the prototypes in lab setting and in beam at CERN (Q2 - Q3)
- 3. Large 100-pad (10 cm × 10 cm) μ rPICOSEC prototype** → ongoing – completion end of Q4
 - ❖ Set up of the μ rPICOSEC test bench in RD&I lab for characterization of the prototypes (Q2 - Q3)
 - ❖ Design finalization of μ RWELL/readout PCB with optimal hole μ RWELL configuration (Q2 – Q3) - Procurement & assembly (Q3 - Q4)
 - ❖ Final test of the prototype (possibly also in high magnetic field) at the CERN test beam facility (Q3 - Q4) - analysis & results (FY24)
- 4. Development of multi-channel fast timing readout electronics** → ongoing – completion end of Q4
 - ❖ PCB layout of PDA-PCB interface board and fabrication of PDA-PCB (Q2 - Q3)
 - ❖ Integration of a 25-channel readout system with CAEN picoTDC DAQ (Q3 – Q4)
 - ❖ Test in beam at CERN the multi-channel readout system with the large μ rPICOSEC prototype (Q3 - Q4)
- 5. Presentation of the results in conference and plans for publication** → Draft peer-reviewed paper in Q4
 - ❖ Presentation of the main optimization studies results on single-pad prototypes at the IEEE NSS/MIC conference at Vancouver (Nov 2023)
 - ❖ Plans to publish the findings of these studies in NIM A or TNS peer-reviewed – Start draft manuscript (Q4 – FY24)
 - ❖ Progress and preliminary results of the large (100-pad) μ rPICOSEC prototype will be presented at future RD51 collaboration meetings.

LD2309 - μ rPICOSEC: Spending profile

DEVELOPMENT OF LARGE AREA PICOSECOND TIMING BASED ON RESISTIVE MICRO-WELL DETECTOR
 (μ RWELL-PICOSEC) FOR FUTURE EXPERIMENTS AT JEFFERSON LAB AND AT THE EIC
 K. GNANVO (LD2309)
 WBS 1.03.LD.010 (Loaded Sk)



	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
YTD Spending	0	4	4	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	0.44	4	4	0	0	0	0	0	0	0	0	0
Funding	284	284	284	284	284	284	284	284	284	284	284	284
3-Mo Avg Projection												