2024-LDRD-11: Second Quarter Update

Florian Hauenstein (PI)
Rafayel Paremuzyan (Co-PI)
Kondo Gnanvo (Contributor)
LDRD Meeting
04/04/24

Advisers: Stepan Stepanyan (JLab),
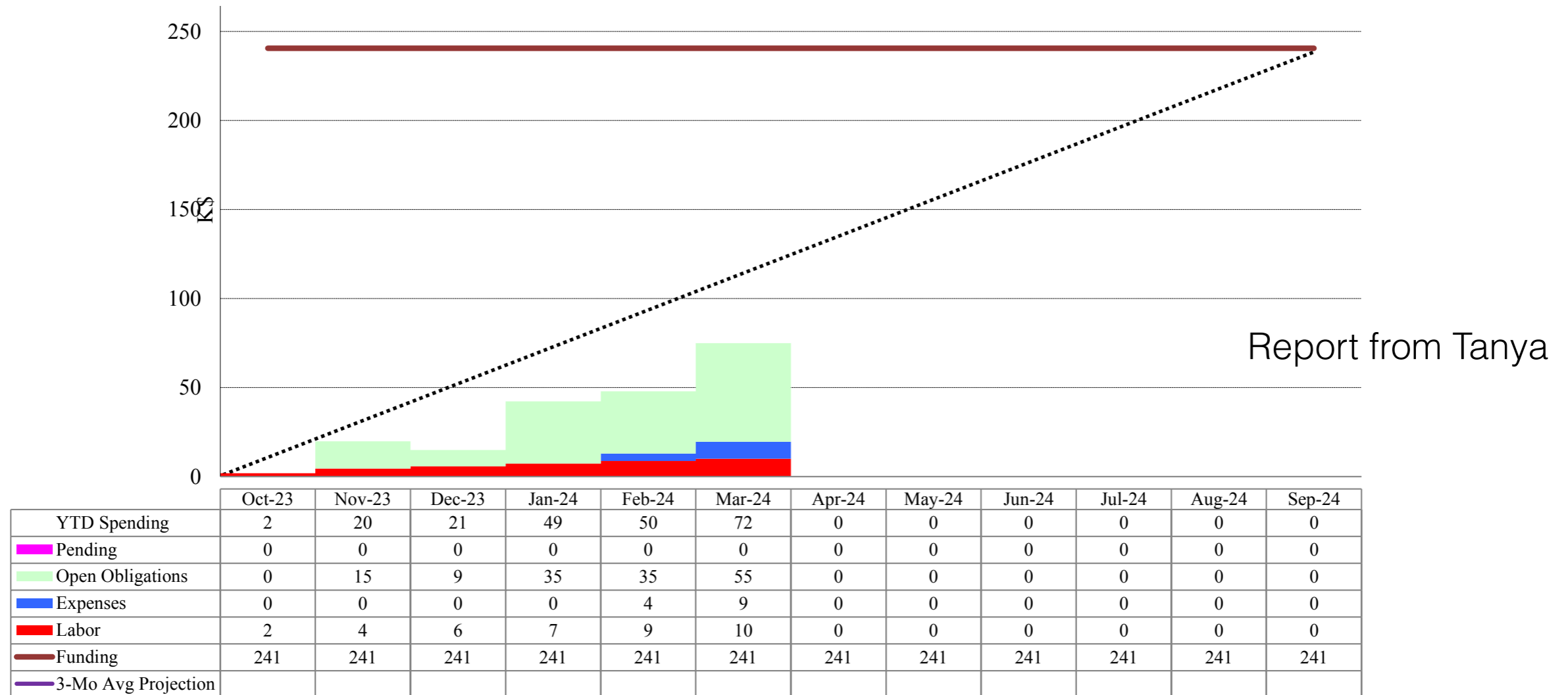Maurizio Ungaro (JLab),
Raffaella Devita (INFN)

Jefferson Lab

Objectives - Status

1. Design and construction of µRWELL prototypes for high-rate operation (6 month)
   - Construction in progress at CERN
   - Delivery delayed until mid May (~ 2 month delay)
2. Postdoc will start May 1st (7 month delay)
3. Cosmic test setup
   - GEM trackers arrived two weeks ago (assembly in progress, testing start soon)
   - VXS crate ordered (expected to arrive in July)
   - Purchase of SRS readout crate from CERN not possible due to issues with getting CERM team account (signature stuck due to disagreements in legal terms)
     - borrow crate from other groups at the lab
     - no spending of budgeted money for crate
   - Hit reconstruction in a high-rate environment (6 month)
     - Basic reconstruction available
     - Expect to finish this month
     - Additional manpower from HallB (per suggestion from first quarter LDRD meeting)
     - Con: some weeks delay due to reimplementation of geometry

Budget Status - End of March

Report from Tanya

	Oct-23	Nov-23	Dec-23	Jan-24	Feb-24	Mar-24	Apr-24	May-24	Jun-24	Jul-24	Aug-24	Sep-24
YTD Spending	2	20	21	49	50	72	0	0	0	0	0	0
Pending	0	0	0	0	0	0	0	0	0	0	0	0
Open Obligations	0	15	9	35	35	55	0	0	0	0	0	0
Expenses	0	0	0	0	4	9	0	0	0	0	0	0
Labor	2	4	6	7	9	10	0	0	0	0	0	0
Funding	241	241	241	241	241	241	241	241	241	241	241	241
3-Mo Avg Projection												

- Open Obligations
  - urwell: $29k
  - VXS crate: $20k
  - Test stand equipment: $6k
- Labor expenses not on track due to delayed start of postdoc, mismatch of ~$50k to $120k (50% funding)
- Some catch-up from additional manpower for software work in the next month and increased work from testing prototypes but might still end up $30-40k short
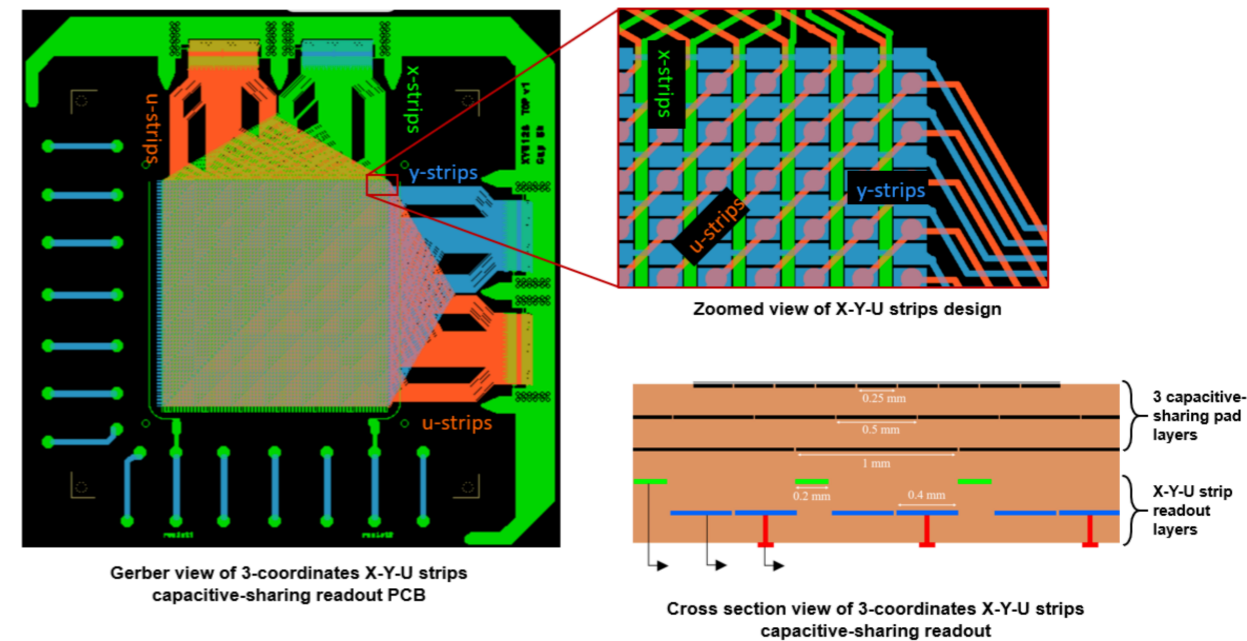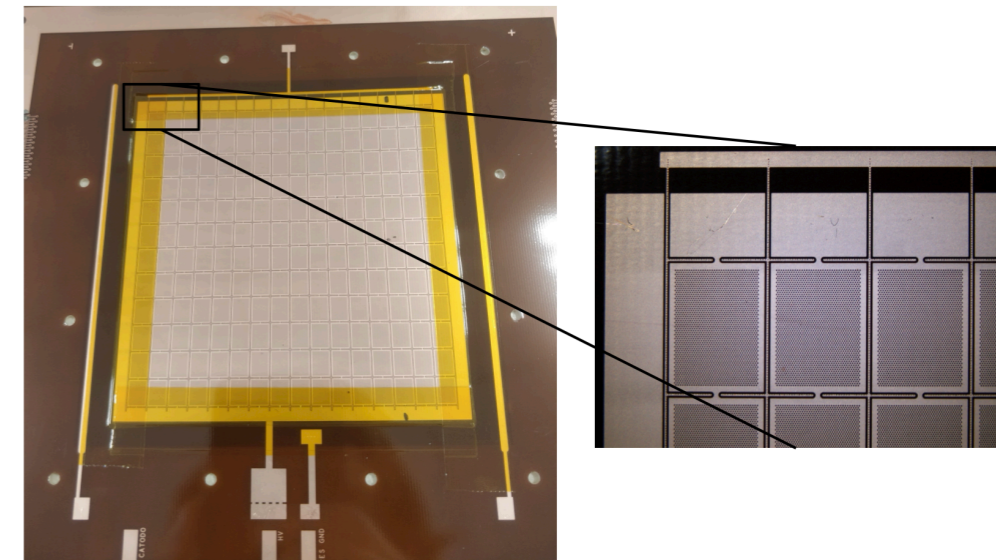
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Backup Slides

High-rate µRWELL Designs for Prototypes

Figures from K. Gnanvo

1. Segmented resistive layer and grounding lines
   - Allow for higher particle fluxes
   - Optimization between gain in rate and geometrical acceptance

2. Thinner gap size

3. 2D and 3D (XYU) readout
   - Capacitive-sharing structures
   - Reduction of hit ambiguities better in 3D

Zoomed view of X-Y-U strips design

Gerber view of 3-coordinates X-Y-U strips
capacitive-sharing readout PCB

Cross section view of 3-coordinates X-Y-U strips
capacitive-sharing readout

Several prototypes to study individual effects

prototype	DLC design	readout	gap width
A	1	2D	normal
B	2	2D	normal
C	1	XYU	normal
D	1	2D	thin

Roles and Responsibilities

Name	Role	FY Effort (% FTE)	Responsibilities
Florian Hauenstein	PI	15	Oversee project as PI and work on design and test of prototypes
Rafayel Paremuzyan	Co-PI	10	Development of simulation and reconstruction together with Postdoc, support prototype tests
Kondo Gnanvo	Contributor	5	Design of prototypes, support testing of prototypes
TBD	Postdoc	80	Development of software, test measurements of prototypes