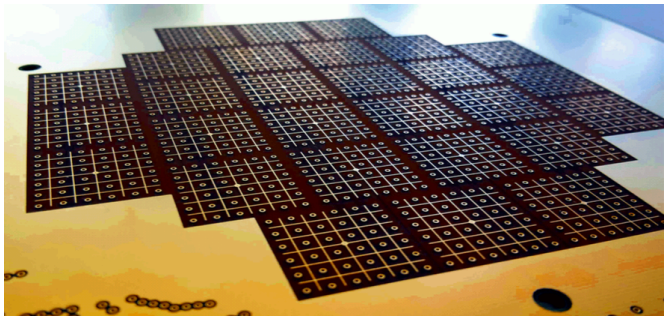
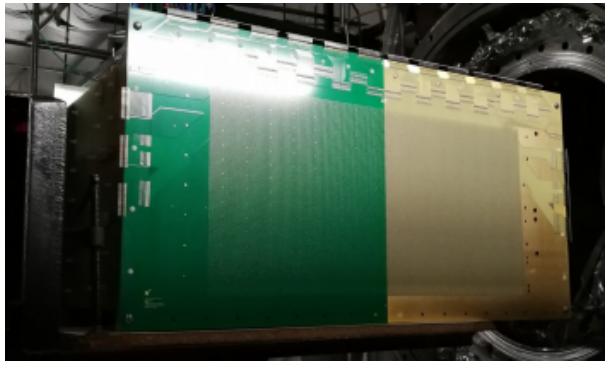
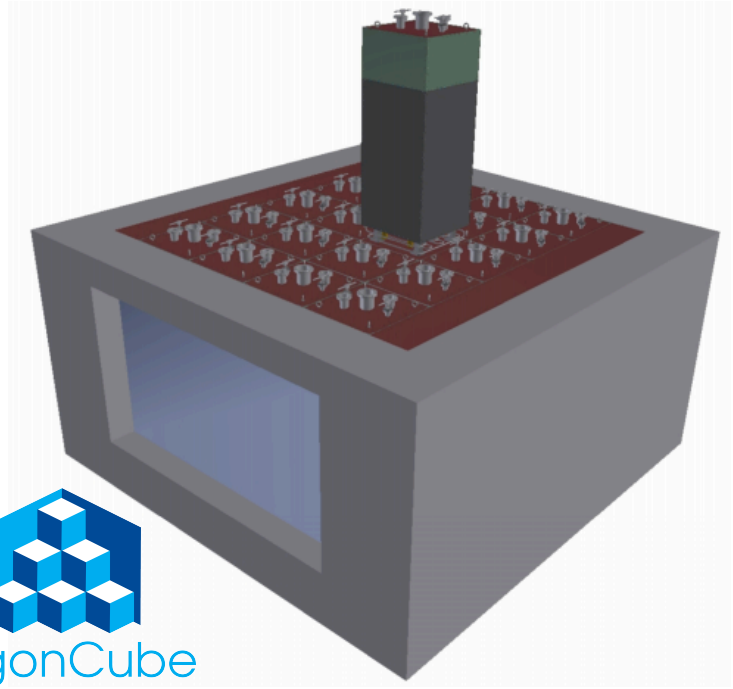
Introduction to the Pixel LArTPC Autumn Workshop

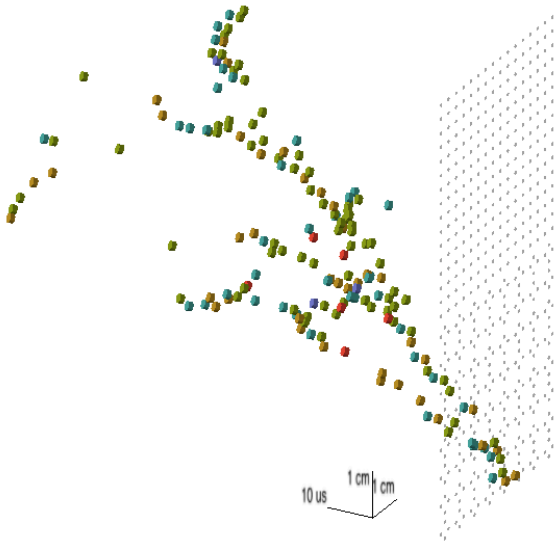
Dan Dwyer, Jonathan Asaadi, James Sinclair

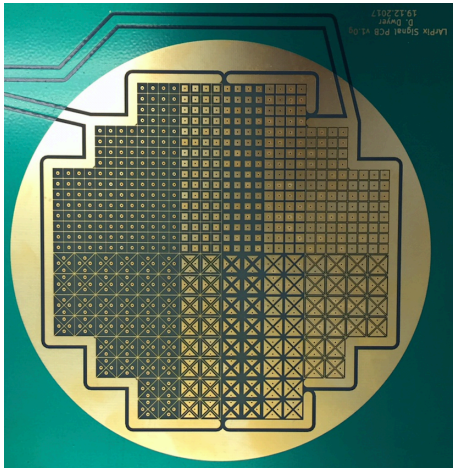
Sep. 29, 2018

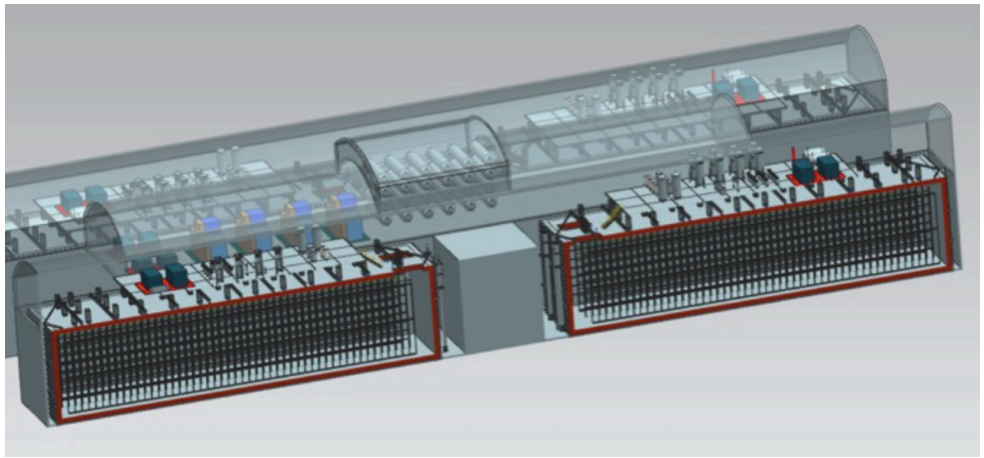












Workshop Goals

Explore the potential for large-scale Pixel LArTPC technology

Today's Goals:

- Share ideas
- Discuss existing progress
- Consider context of DUNE plan
- Explore R&D partnerships

Today's Schedule:

- **Morning:**
  - Overview of physics potential
  - DUNE Context
  - Review of R&D progress, concepts
- **Afternoon:**
  - Technical Details
  - R&D Coordination
- **Dinner**

08:30 - 10:00 Introduction (Curia II)

08:30 **Introduction and Workshop Goals** *25'*
Speakers: Jonathan Asaadi (University of Texas at Arlington), Dr. Dan Dwyer (LBNL), Dr. James Sinclair (University of Bern)

08:55 **DUNE Physics considering Pixel Readout** *30'*
Speakers: Jonathan Asaadi (University of Texas at Arlington), Dr. Chris Marshall (Lawrence Berkele National Laboratory)

09:25 **Cold Electronics Plan for the 1st DUNE 10 kTon Far Detector** *20'*
Speaker: Marco Verzocchi (Fermilab)

09:45 **Summary of Argonne Workshop** *15'*
Speakers: Marcel Demarteau (Argonne National Laboratory), Prof. David Nygren (University of Texas at Arlington)

10:00 - 10:30 Coffee

10:30 - 12:00 Morning (Curia II)

10:30 **LArPix Status and Plan** *20'*
Speaker: Dr. Dan Dwyer (LBNL)

10:50 **NetPix Concept** *15'*
Speaker: Prof. David Nygren (University of Texas at Arlington)

11:05 **Pixels in HPGArTPC** *15'*
Speakers: Prof. Alan Bross (Fermilab), Jennifer Raaf (Fermilab)

11:20 **Broader ArgonCube R&D Program** *20'*
Speaker: Dr. James Sinclair (University of Bern)

11:40 **Detector-Scale Pixel System Needs** *20'*
Speaker: Dr. Igor Kreslo (LHEP, Bern University)

12:00 - 13:00 Lunch

13:00 - 15:00 Afternoon (Curia II)

13:00 **Pixel Readout Cost Model** *20'*
Speaker: Dr. Dan Dwyer (LBNL)

13:20 **Demonstration Roadmap** *20'*
Speaker: Jonathan Asaadi (University of Texas at Arlington)

13:40 **Photon readout with Pixels** *15'*
Speaker: Dr. Igor Kreslo (LHEP, Bern University)

13:55 **GArSoft - pixel reconstruction in gas & a little history** *15'*
Speaker: Dr. Thomas Junk (Fermilab)

14:10 **Development of 3D Analysis Techniques** *15'*
Speakers: Dr. Kazuhiro Terao (SLAC National Accelerator Laboratory), Tracy Usher (SLAC), Dr. Yur Tse Tsai (SLAC)

14:25 **Pixel vs Wire Performance via Deep Learning** *15'*
Speakers: Dr. Roxanne Guénette (Harvard University), Eric Church (PNNL), Dr. Corey Adams (Harvard University)

15:00 - 15:30 Coffee

15:30 - 17:30 Closing (Curia II)

15:30 **Opportunities in the ArgonCube Program** *15'*
Speaker: Prof. Antonio Ereditato (University of Bern)

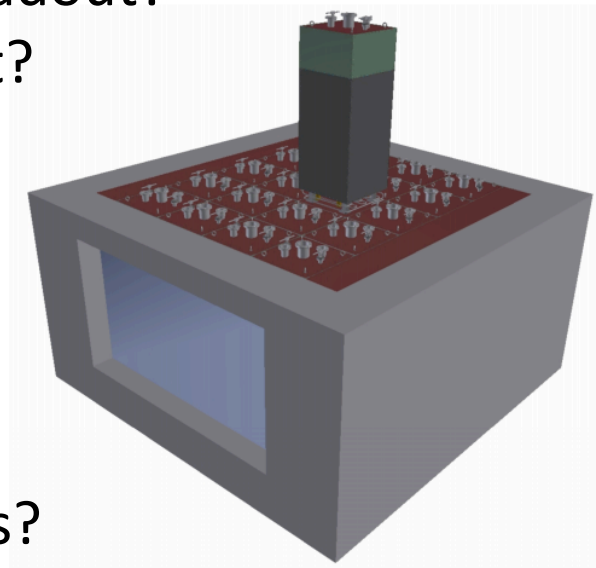
15:45 **Discussion, Expressions of Interest** *1h0'*

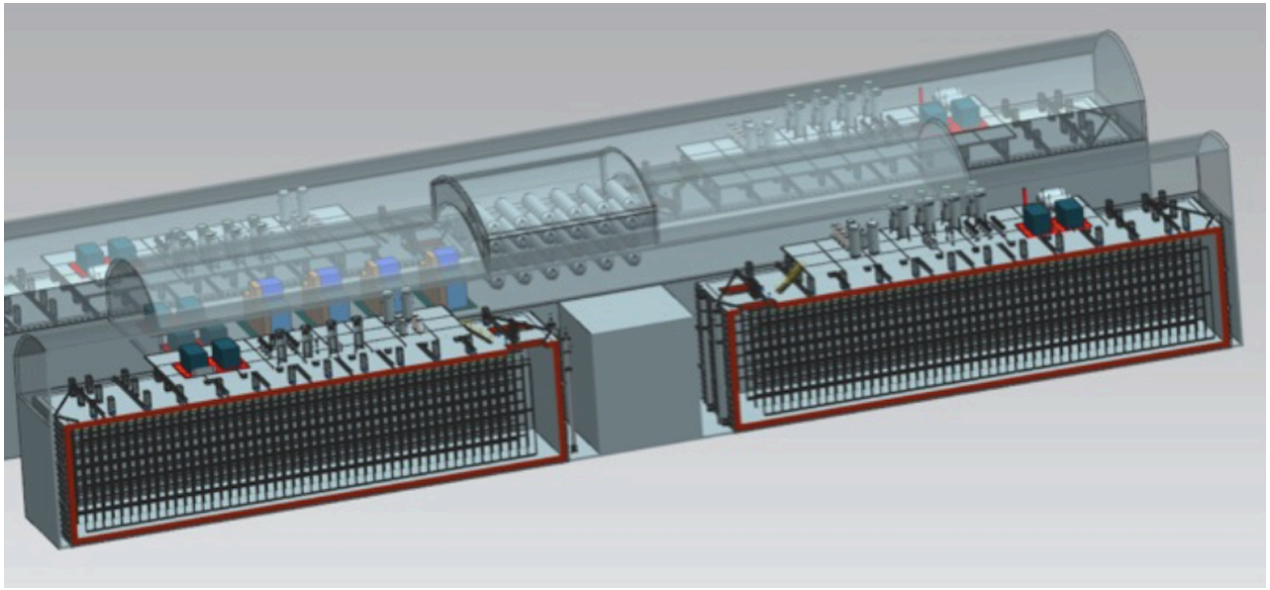
16:45 **Closeout** *30'*
Speakers: Jonathan Asaadi (University of Texas at Arlington), Dr. Dan Dwyer (LBNL), Dr. James Sinclair (University of Bern)

Questions

Questions to guide today's discussions:

- How to demonstrate the physics potential for pixel readout?
- What are the technical requirements for pixel readout?
- What has been demonstrated, what is lacking?
- What are the implications for photon detection?
- What can we learn from the LArIAT, ArgonCube 2x2?
- What does a pixel DUNE Near Detector look like?
- What about a pixel Far Detector Module?
- What R&D program is needed to achieve these targets?
- How do we best coordinate our R&D activities?





Logistics

If you want lunch, pay up! → $25

Attending dinner? → Confirm with quick head count