

U.S. Overview and Outlook



ArgonCube

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U.S. Collaboration in ArgonCube

- I'm expanding the scope a little here to include "the Americas" because there are groups in Brazil who have contributed in the PixLAR run and have expressed interest in continuing collaboration
 - Federal University of ABC, Brazil (UFABC)
 - University of Campinas, Brazil (UNICAMP)
- This is in addition to the existing active US institutions
 - UT Arlington
 - Colorado State University
 - Fermilab
 - Harvard
 - SLAC
 - LBNL
- As well as historic US collaborators who have been less active recently, but have showed continued support for the effort
 - Yale
 - Syracuse
 - BNL



Generating broader interest...

- In addition to this, the broader success and continuing efforts has attracted more general effort in the U.S.
 - Argonne National Labs
 - University of Pennsylvania
 - Northern Illinois University
 - ...
 - Some of this has been spurred on by the interest of the alternative/complimentary R&D pixel based readout proposed by D. Nygren (UTA)
 - People also increasingly interested in the idea of a pixel based module for the DUNE far detector
- This broadening interest and new ideas requires some coordination on the U.S. side
 - Need to communicate with each other and need to communicate with the funding agents

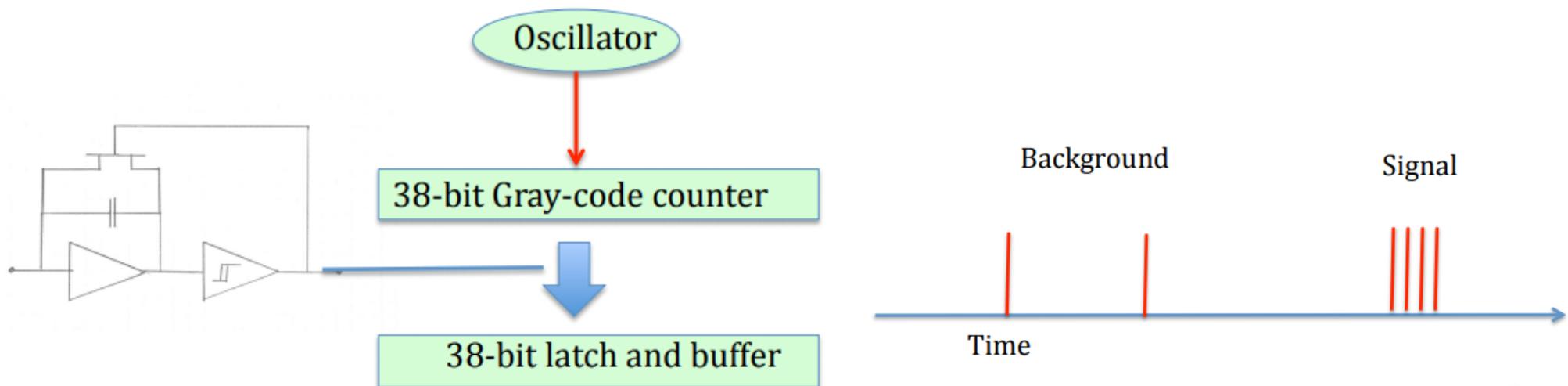


Illustration of Nygren's Reset Time Difference Readout

Meeting this summer

- **Encouraged by D. Nygren (UTA) and M. Demarteau (ANL) I am helping arrange a meeting at Argonne this summer**
 - Don't shoot the messenger ;-), I'm just trying to help coordinate and support!
- **The meeting is meant to be inclusive and collaboration building**
 - **First priority:** Allow people who are new to the efforts and those who have been working at this for awhile understand the who/what/where of the current landscape
 - **Second priority:** Develop a strategy for the pursuit of complimentary technologies
 - e.g. Pixel readout R&D, light readout R&D, Pixelizing the far detector
 - **Third priority:** Develop the questions/metrics to make the physics argument why pixelizing the far detector is an overall win
 - We all know the physics reach would be better....but can we quantify "how much better"
 - A group of us (Harvard, UTA, PNNL) have been playing around with this question some and we would welcome reconstruction experts to weigh in and give input

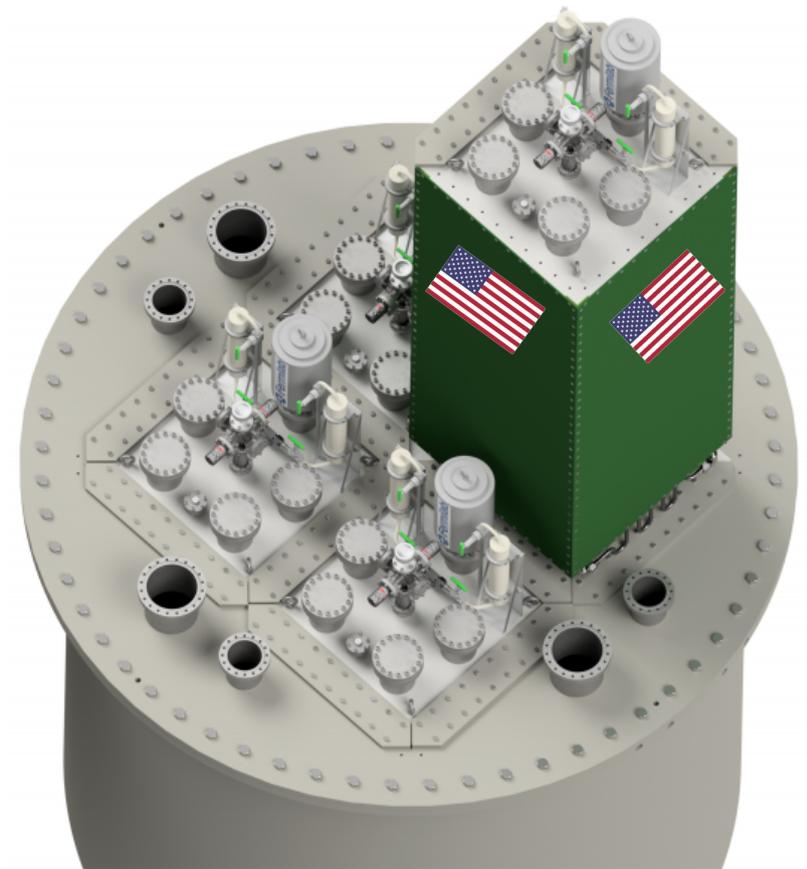
Preliminary Date for the summer meeting:

Tuesday August 14th 2018

(date and location still to be confirmed)

U.S. Activities

- **My personal short term goal:**
 - (1) **To have one demonstrator module built by U.S. groups for the 2x2**
 - This will need to be coordinated with U.S. university and lab groups
 - Need a timeline, interested groups/subsystems, and some sort of funding profile
 - UTA pursuing funding for components and people
 - University level funding (O(\$30k) (very encouraging))
 - DOE Science Graduate Student Research Fellowship in collaboration with LBNL (D. Dwyer...awaiting decision August 2018)
 - DOE/NSF Early Career awards (awaiting decision this year...fingers crossed)
 - Looking to collaborate with groups for NSF MRI



U.S. Activities

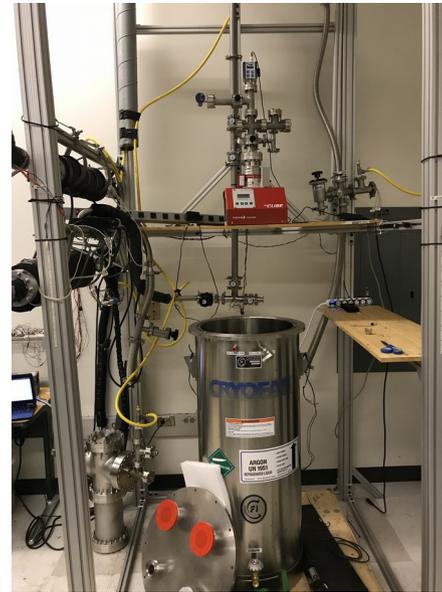
- **My personal short term goal:**
 - (2) **Another run using the LArIAT setup with LArPix v2**
 - PixLAr 2.0!
 - Opportunity to attract more collaborators
 - Design to do physics!
 - Minimize dead space in the upstream TPC
 - Try new versions of light readout
 - Design to demonstrate the electronics at scale!
 - Request for support already put in to Fermilab for run in spring 2019
 - Will require some coordinating with currently running beam experiments
 - Will also require a good amount of real person-power for putting the beamline back together, installation, operations, and data analysis
 - Will also require effort to integrate the readout into the DAQ



PixLAr TPC during installation

U.S. Activities

- My personal short term goal:
(3) To enable testing/prototyping capabilities at various US ArgonCube facilities
 - Been working with the SLAC and CSU groups to share my experience and setup
 - Coordinating what work/assembly/testing will happen at which institution should help inform what is needed where
 - Electronics testing
 - High Voltage
 - Field Cage
 - Etc....
 - More work do to on this front!



Purification System as built at UTA with the smaller 117 liter cryostat



Cryofab 3048 540 Liter cryostat

PixLAr 2.0 Run 2019

- **The schedule here (at the moment) is a little unclear because it depends on a few external factors**
 - Availability of LArPix v2 (approx. early 2019)
 - PCB manufacturing and pixel design
 - Need to include some testing time
 - Any additional light detection R&D we would like to install
 - Coordinate with Fermilab Testbeam and other running experiments (NOvA testbeam)
- **We also need to think about the overlap with the 2x2 module operation**
 - Person power is likely to be a limiting factor (specifically during installation and data taking shifts)
 - Also need to be sure we have clear physics goals outlined for characterization
 - ~7 weeks of running collected a good amount of data in 4 different beamline configurations during the previous PixLAr run
 - Likely need similar amount of running time for PixLAr 2.0

PixLAr 2.0 Possible Calendar

2019

- Preparation (Now - February)
- Installation at FNAL (5 weeks)
- Running (7 weeks)

January

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February

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Question: Where does 2x2 activity fall on this calendar?

Discussion Points

- **What is the best way to coordinate funding requests amongst the US groups in support of ArgonCube effort?**
 - NSF MRI
 - Detector R&D from DOE
 - Base grants
 - Early career awards
- **What are the institutional responsibilities we would like to have listed/formalized in support of these funding requests?**
 - Interests versus needs
- **What are the timelines for the efforts in 2019**
 - PixLAr 2.0
 - ArgonCube 2x2
 - Small scale R&D (field cage, light detectors, LArPix)

Thanks!