LAr R&D Progress Report

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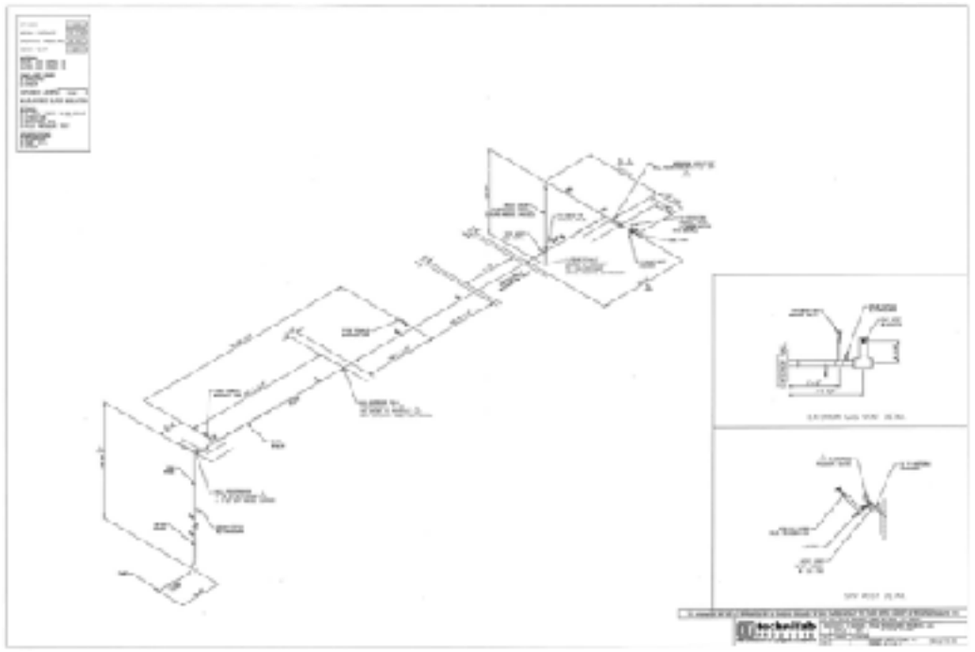
11/14/23

Lab Safety and Space Management

- High Bay End room cleanup
  - The rigging team visited the room last week
  - A work order is in for this Thurs./Fri. To move the winding machine and roller boxes out of the room
  - Moving the table and dewars in our area to make the clearance
- LN2 plumbing with Techinfab
  - MPO requested to split the contract into two: Design and Fabrications/Construction
  - MPO wants the vendor to deliver the design and drawings for approval before building things
  - The vendor Techifab has provided revised contracts
  - MPO requires more specific SOW input on the contract, working with the vendor to update the quotes



CPAD 2023

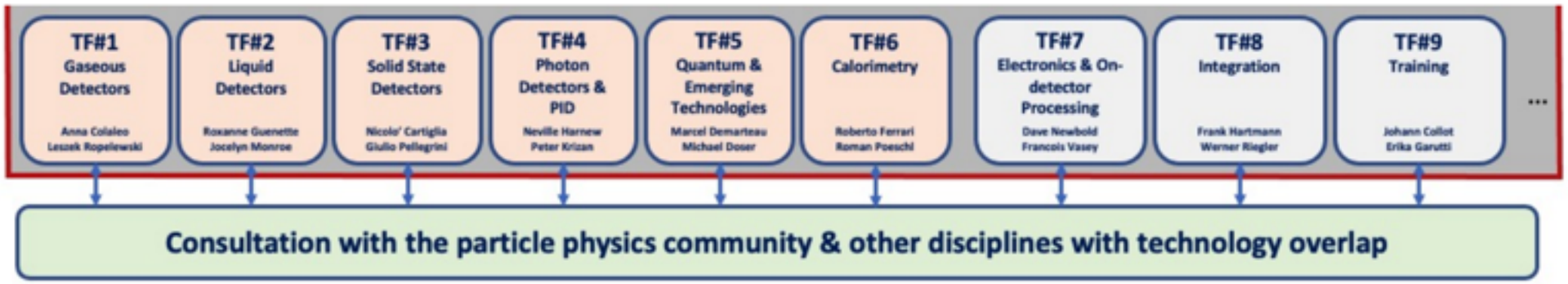
- European Committee for Future Accelerators (ECFA) released in 2021 a full document (200 pages) and synopsis (~10 pages) with this content:
- Overview of future facilities (EIC, ILC, CLIC, FCC-ee/hh, Muon collider) or major upgrades (ALICE,Belle-II, LHC-b,…) and its timeline
  - • Nine Technology domains based on Task Forces areas
  - • The most urgent R&D topics in each Task Force area identified as Detector R&D Themes (DRDTs)
  - •Concludes with ten “General Strategic Recommendations”
- A CPAD equivalent organization in Europe, DRD(Detector R&D) collaborations
- CPAD working groups have the similar structures in separate RDCs(R&D Collaboration) topics

CPAD RDCs

RDC#	TOPIC
1	Noble Element Detectors
2	Photodetectors
3	Solid State Tracking
4	Readout and ASICs
5	Trigger and DAQ
6	Gaseous Detectors
7	Low-Background Detectors
8	Quantum and Superconducting Sensors
9	Calorimetry
10	Detector Mechanics
11	Fast Timing

11/7/23

DRDs in Europe



CPAD 2023 RDC1

- I attended all the RDC 1 sessions on noble elements

RDC1: Noble Element Detectors

Jonathan Asaadi
Carmen Carmona

- 5 sessions (3 RDC1, 1 joint RDC1/RDC2/RDC7, 1 joint RDC1/RDC4), 24 presentations + 5 posters
- List of work packages already identified. Based on DRD2, but more packages added to adapt to US groups:
  - Heat Readout: Phonon Sensors
  - Charge Readout: Pixels; Charge+Light; Charge-to-light (EL and Amp.); Ion Detection (EL and Amp.)
  - Light Readout: Increased sensor Q.E./P.D.E; Wavelength Shifters/Expanded Wavelength; Increase Collection
  - Target Properties: Properties and Isotope and chemical; Chemical Purity; Target Response and Modeling; Low Energy / Spurious Signals
  - Scaling-Up Challenges: Radiopurity & Background Mitigation; Detector and Target Procurement/production; Large Area Readouts; Material Properties; In-situ Calibrations; High Voltage; Infrastructure
  - New Initiatives/Novel Architectures: Solid Nobles; Phase Changing Detectors
  - Cross RDC: Data Volume
  - Facility Coordination
- We will plan regular meetings

CPAD 2023 RDC2

- I attended part of the RDC 2 session

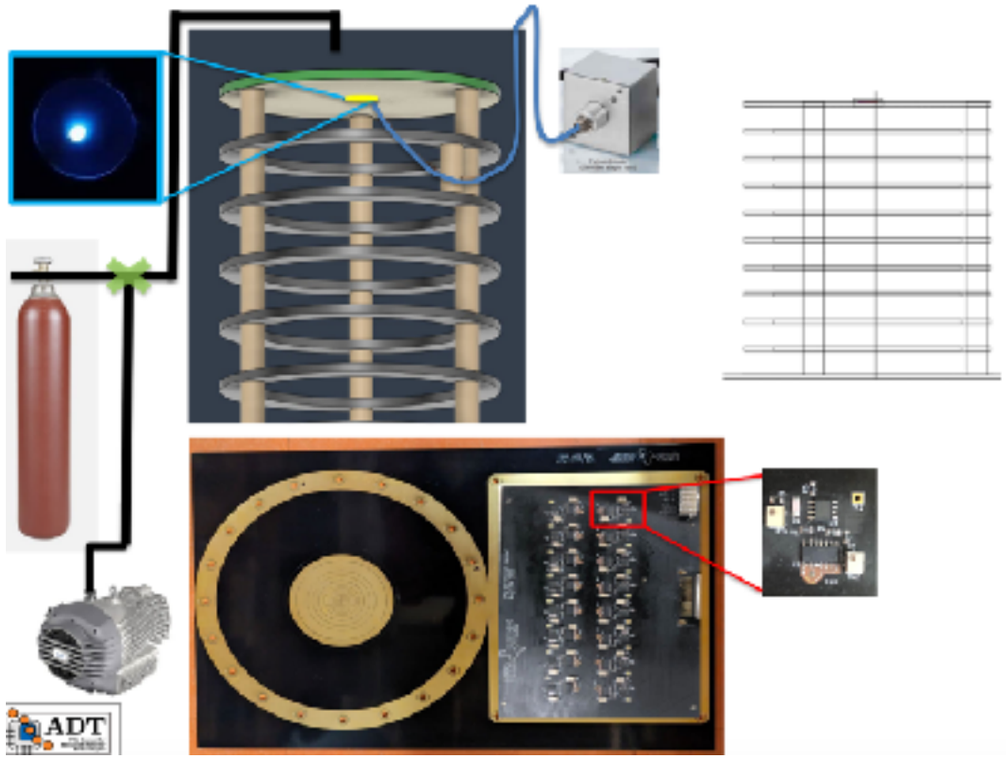
Shiva Abbaszadeh
Flavio Cavanna

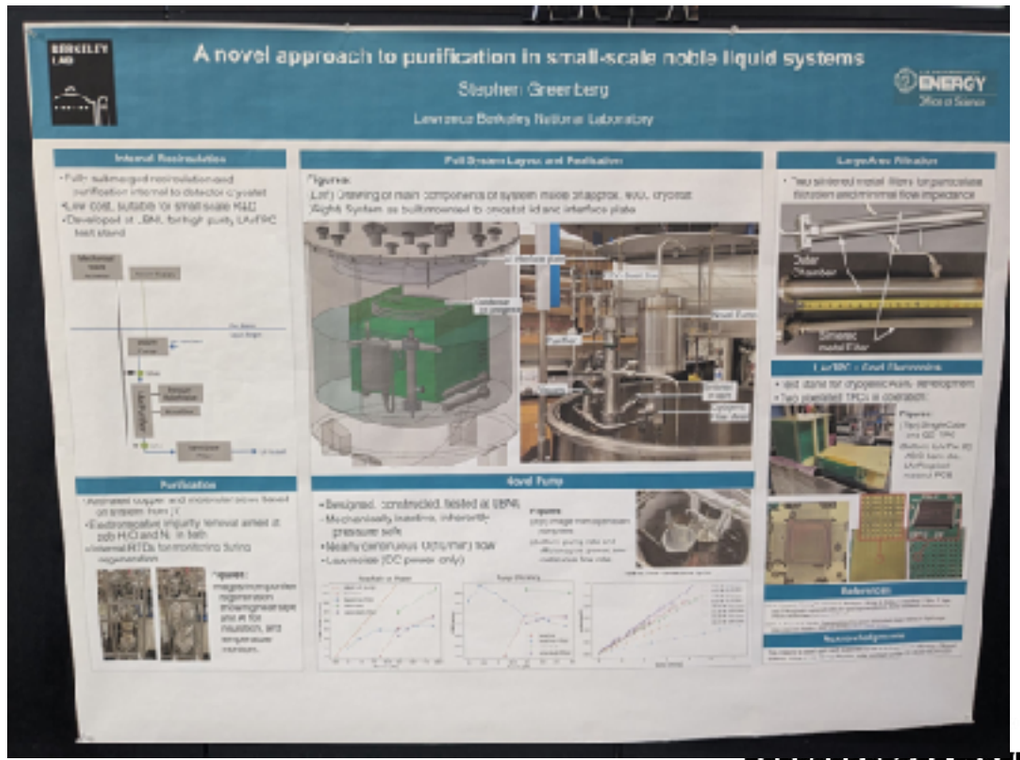
RDC2: Photodetectors

- 3 sessions (2 RDC2, 1 joint RDC1/RDC2/RDC7) 20 oral and 9 poster
- List of work packages already identified:
  - **Innovative photosensor breakthrough:**
    - Blue skies research aiming to advance single photon detection, VUV sensitive,tunable spectral sensitivity, high granularity and fast timing, radiation tolerance and large area capability.
  - **Large Area Photodetector Systems and Scalability:**
    - Project-specific Research and Development (R&D) for Large Area Photodetector Systems, integrating photo-sensors with advanced readout technologies. Photodetector integration and deployment (overlap with RDC1, 4, 5, 10, 11)
- Planned quarterly meetings
  - Started a shared google drive to coordinate different universities lab capabilities, facilities to identify existing and potential areas for collaboration: https://docs.google.com/presentation/d/1_5JCRbVtqJJkyK7p3A7z6Z8cLZ3TKLIokTJd_7cvs-M/edit?usp=sharing
  - Will send out survey to identify potential topics for virtual workshop

CPAD 2023 some highlights

- Presentation from UTA with Q-Pix”Measuring the transverse diffusion of electrons in gasses: A laboratory-scale demonstration of the physics capabilities of Q-Pix”
  - The transverse diffusion was measured in P10 gas, results close to the known value
  - The electronics can be used in LAr but the collection electrode needs mofification due to much less diffusion in liquid
- Poster from LBNL from Dan Dawyer’s group
  - A LAr argon pump with ~1.0L/min circulation speed immersed in LAr
  - Patent in process, no details provided
- Presentation from SLAC“CRYO ASIC: A System-on-Chip (SoC) for Charge Readout in the nEXO Experiment”





CPAD 2023

- CPAD 2023 held at SLAC from 11/7-11/10
- The poster display was on 11/7-11/8 with ~30 posters, presentation was on 11/7, 6-8pm
- A couple of audiences showed interest in the work

Stanford nEXO lab tour

- Talked to colleagues from LXe community about the cryo-pumping
- Evan kindly showed me the Stanford LXe lab showing the system
- Learned many experiment on the system construction and operations




260L LAr System

- Briefly went through the PrM on the 260L System with Nitish
- The input fiber was found broke
- Running the full system check-up with Nitish this week
- Need ensure the fully functioning of the PrM in the next run