

# LAr R&D Technical Meeting

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# Meeting Agenda

- Problems found during the cryogenic operation
- Addition equipments to purchase
- Hardware issue resolutions
- Future test chamber design
- Additional equipment for the next run, a heater?

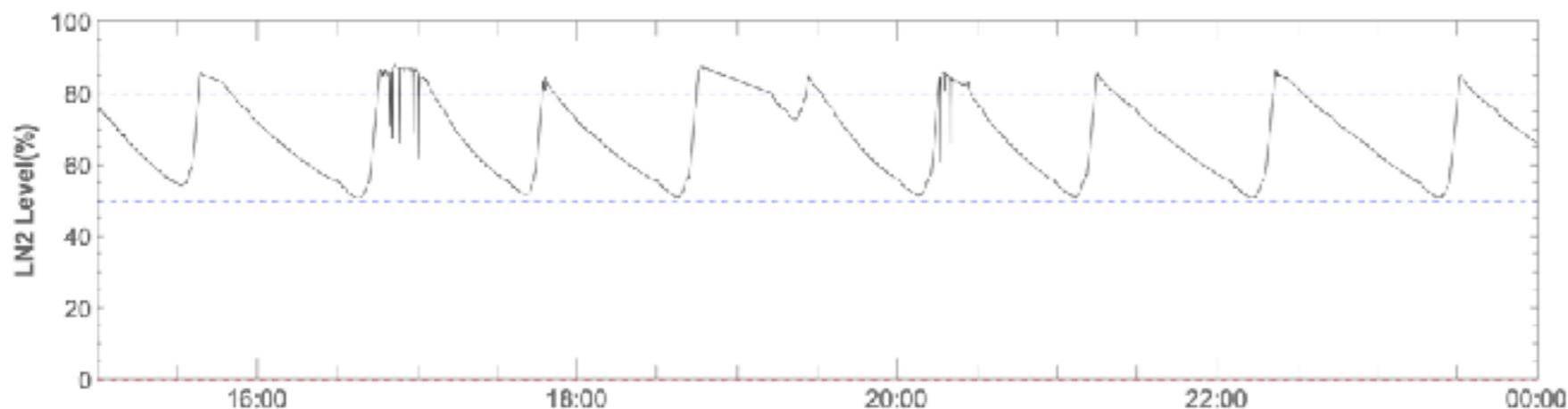
# LN2 supply

- ▶ **The cryogenic operation has been lasted for 40 days**
  - Daily (24hrs) LN2 consumption is a bit more than half of 230 L LN2 supply dewar
  - LN2 supply dewar changes once a day, about every 24 hrs
  - LN2 supply dewar refills everyday from the 6000 gallon tank
  - 6000-gallon tank was topped off last Friday
  - Leakage on the plumbing was fixed by Russ with new tapes and tightening the fittings



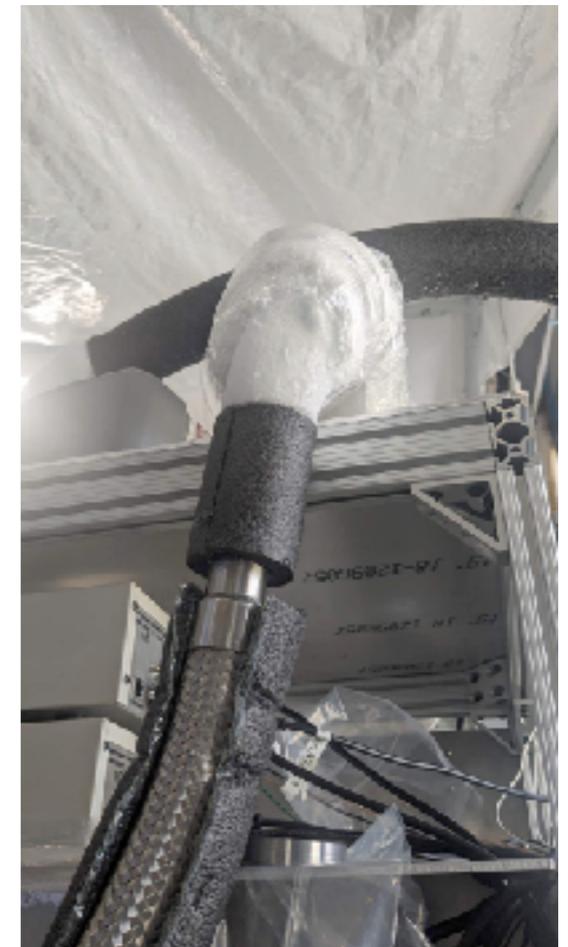
# LN2 Automatic filling

- LN2 filling cycle is ~1 hr which is shorter than the previous runs with less LAr
- 2x 50 Psi LN2 dewar required for the filling, one for LN2 supply, the other supply pressure for maintaining filling pressure
  - Second LN2 required for maintain the pressure because the pressure can't built up enough between fillings
  - The pressure support dewar consumption is very low, only refilled once so far
- **Automatic LN2 batch filling between 55%-85% of condenser level**
  - The filling can be controlled by PC or the LN2 level gauge controller
  - Used only LN2 level gauge controller only this run, independent of the slow monitoring PC
  - Mandatory Windows updates took 1.5 hrs to finish yesterday, required by ITD
- **Some instability found occasionally**
  - Associate with over filling with too much filling pressure
  - Now reduced the pressure supply to ~46 psi, very stable so far



# Problems found during the operation so far

- ▶ **Icing noticed on the super insulated filling hose**
  - The vacuum seal plug popped
  - Need to re-evacuate before next run
- ▶ **Ice accumulation on the N2 venting plumbing**
  - Significant ice ball on the relief valve and un-insulated plumbing
  - Conducting the de-icing with heat gun once a week
  - Going to add industry fans on the top



# Problems found during the operation so far

## ▶ **Water drop from the setup**

- Results of the icing part, expected to be improved by the fans

## ▶ **Worn out LN2 fittings on the supply dewar**

- The brass fittings on the LN2 dewar have worn out with years of use
- Ordered replacement for full replacement of all the LN2 fittings

## ▶ **Differential level gauge**

- Still doesn't provide right readings for the LAr
- Need more bench test and replacement



# Hardware Procurement Status

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## ▶ **Equipment on order**

- Hamamatsu VUV SiPM x 18 pcs ordered
- Hamamatsu Cryogenic PMT x 5 pcs ordered
- CAEN HV supply
- Hamamatsu MgF 2x PMTs
- DAQ CAEN 1740

## ▶ **Additional Hardware**

- Signal feedthru/flange for HV and Photon detectors
- Heater to accelerate the circulation
- Mass flow meter to measure the circulation rate
- ...

# Future Measurement Plan

- ▶ **LAr Purity model validation measurement**
  - In progress with the running 260-L system
  - Continuous electron lifetime measurement with purification on/off
- ▶ **Dichroic filter measurement**
  - Using SiPM with one side covered with filter and wavelength shifter
  - Filter expected from Raytum in about a month
  - Still need to figure out the wavelength shifter
  - Scintillation light by cosmic ray inside the system should be sufficient for light source
- ▶ **FLArE prototype test**
  - Test chamber design