

LAr R&D Progress Report

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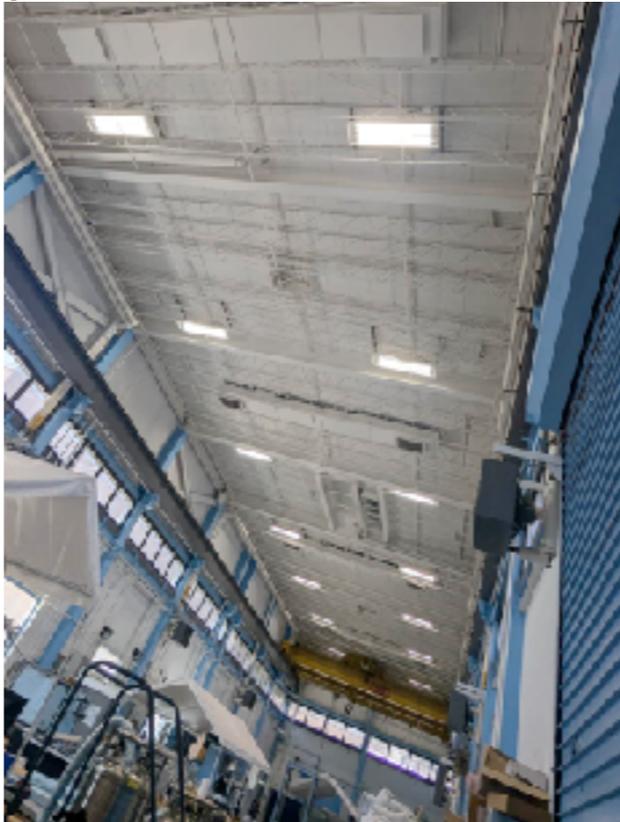
Lab Safety and Space Management

▸ **Safety reminders**

- June is the national safety month
- DOE's inaugural safety "Day of Reflection" tomorrow on June 26th
- 10am BNL special meeting in the Physics Large Seminar Room (Bldg. 510)
- 2-2:30 Physics Department Safety Reflection meeting in the Small Seminar Room and on Zoom
- Please try your best to attend

▸ **High Bay lab ceiling light repair, Finished**

- All ceiling lights have been replaced with LED tubes with better brightness and lifetime



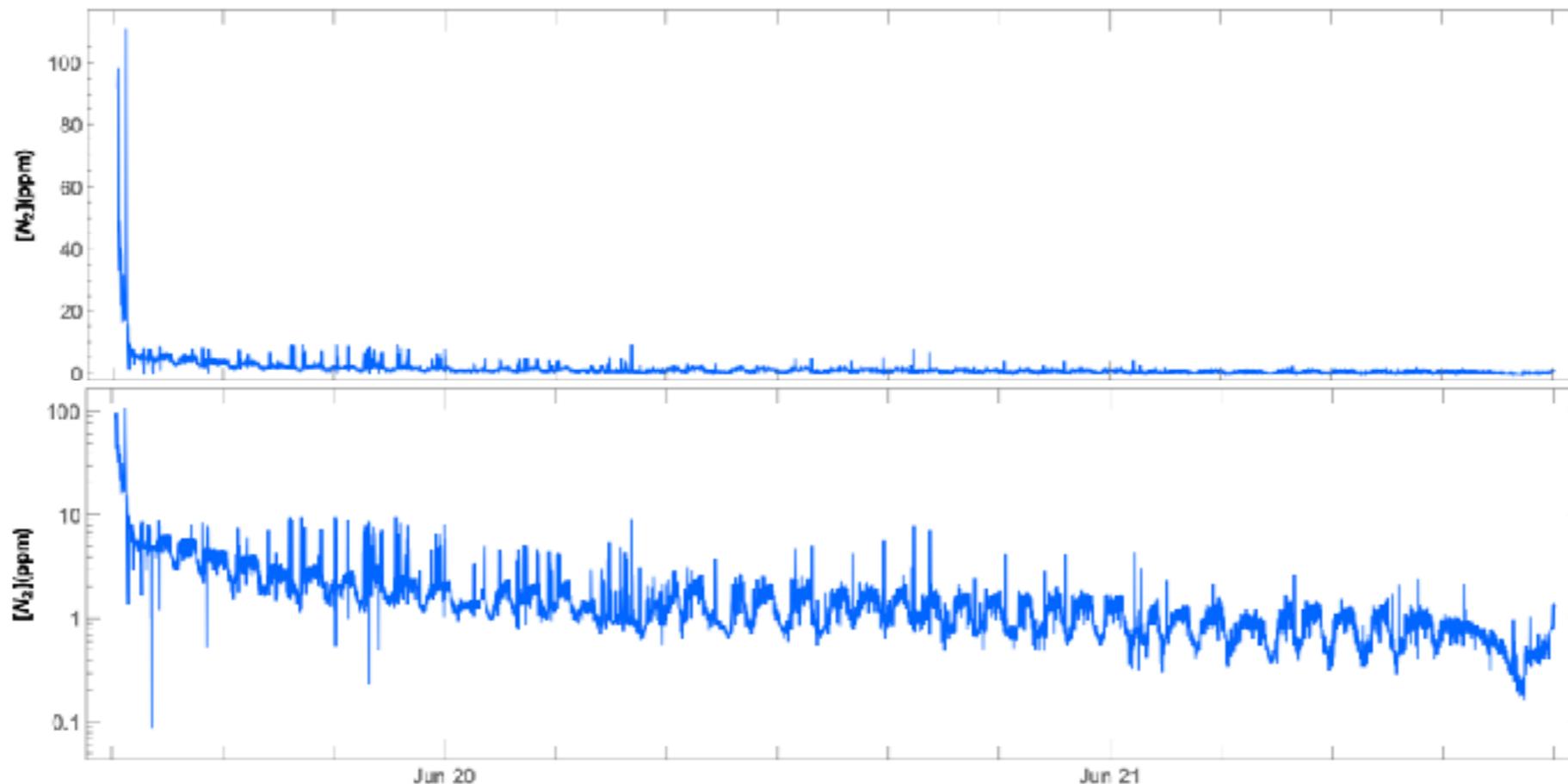
260L LAr System Cryogenic Operation Status

- ▶ **Cryogenic operation was stopped last Friday**
 - This run lasted from 04/04-06/21, 78 days, 11 weeks
 - The longest cryogenic operation of the 260-L LAr cryogenic system
 - No LAr loss during the cryogenic operation
 - Remaining LAr returned to the supply dewar



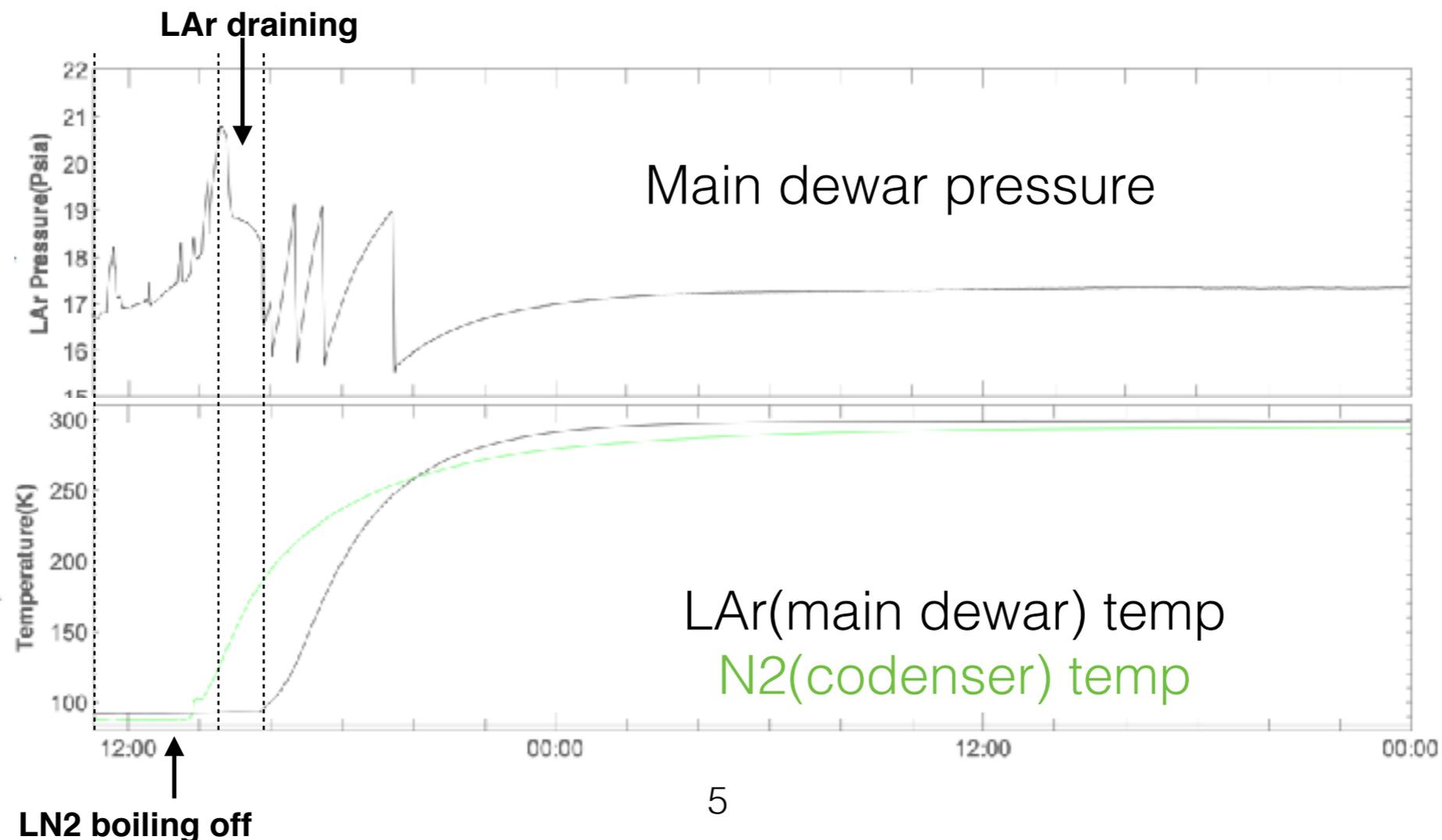
260L LAr [N2] sampling

- N2 concentration was measured with gas analyzer by directly sampling from LAr
- Sampling for about 48 hrs
- LAr level dropped by ~1% during the sampling
- [N2] ~ 1ppm is sufficient for light measurement



260-L Warm Up

- First start with stop LN2 filling to the condenser after topped off the condenser for the last time, ~ 3.5 hrs until the LN2 all boiled off
- Wait for ~1 hr to allow the pressure built up in the main dewar
- Start to draining LAr back to one empty LAr supply dewar with pressure built up to 21 psia, given the head pressure of the supply dewar inlet requires 3 psig to drive LAr
- Back fill LAr into the supply dewar took about 1 hour to finish
- Main dewar warm up with automatic pressure relief
- System took about 24 hours to warm up to room temperature



Summary of this Run

► **Cryogenic operation**

- Overall stable and smooth, many thanks to Lingyun's help
- Long term cryogenic operation capability was demonstrated
- LN2 consumption was stable before the vacuum loss of the filling hose
- Clogged issue observe in the last 2 weeks
- There might be moisture accumulation in the condenser in LN2 volume

► **The goal of purity demonstration of this run was achieved**

- Sub-ppb level purity in terms of O₂ equivalent concentration with electron lifetime $\sim 0.3-0.4$ ms at 500V/cm, $\sim 0.5-0.65$ meter drift distance, sufficient for charge measurement
- [N₂] of ~ 1 ppm is sufficient for light measurement

To do list

- Write the result for a tech note in JINST
 - <https://www.overleaf.com/7284791279ptjcyrszcgyn#3e119a>
 - Following the previous tech note on 20-L system
- Summary of the lesson and experiences learned in this run
- Fixing the issue found in this run
 - Make a low power heater <150W, heating test in LN2 before installation into the system
 - Dry out the condenser volume with continuous compressed air flow
 - Differential level gauge reading repair
 - Insulation on the venting tubing and deicing fans
 - PrM electronics box replacement
- Design and construction for the measurement
 - Dichroic filter received from Raytum