

Proto-0 cryogenic system updates and test

On behalf of Naples group

Cryogenic system commissioning test

Test phases plan

1. Cryostat filling with GAr integration by the inlet MFC;
2. Gradual increase of Ar inlet flow and cooling power (test of the maximum filling speed);
3. Activation of the AL300 and test of the LN liquefaction capability during the recirculation phase (test of AL300 capability during cryostat filling?);
3. Monitoring of the Ar level in the cryostat by new level meter based on PT100s sensors (measurement of the filling rate at different parameters of the inlet flow);
4. Switch between filling mode and recirculation mode to verify PID stabilities over the night and AL300 efficiency to keep the SP level in the condenser LN buffer volume;
5. Monitoring of the pressure stability in the cryostat (new PT with better range and stability);

Cryogenic system commissioning test

Camera and led lighting system installation



Cryogenic system commissioning test

Start of the test: May 3rd

- We tried to operate with the AL300 during the filling of the cryostat
- It was not sufficient to liquefy at maximum speed with AL300 only
- With AL300 and direct LN filling simultaneously the system was too unstable
- We switched off the AL300
- We went on with the LN direct supply from the external tank during the filling

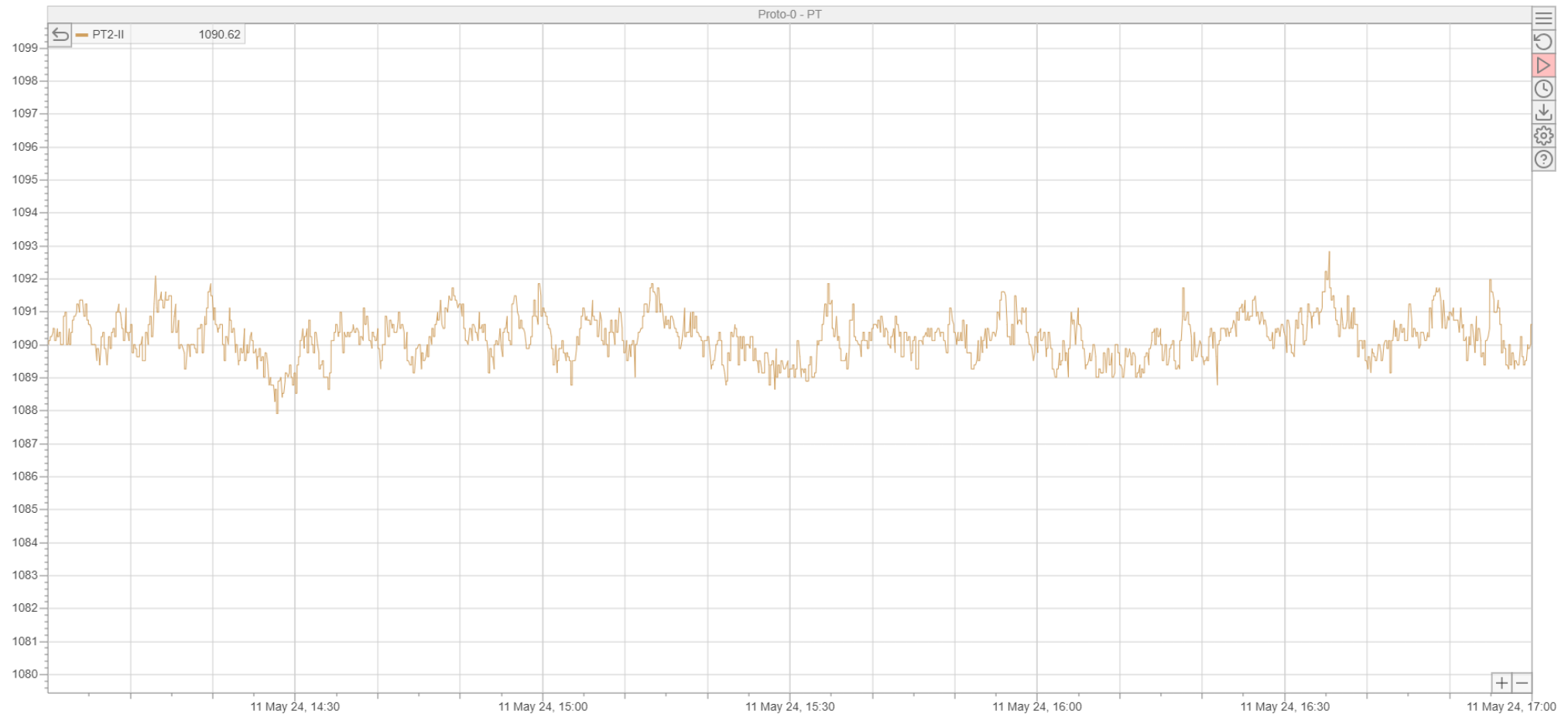
We reached a maximum filling speed of 7 l/h of LAr (GAr supply with MFC_Ar at 80 slm)



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Pressure stability in the cryostat

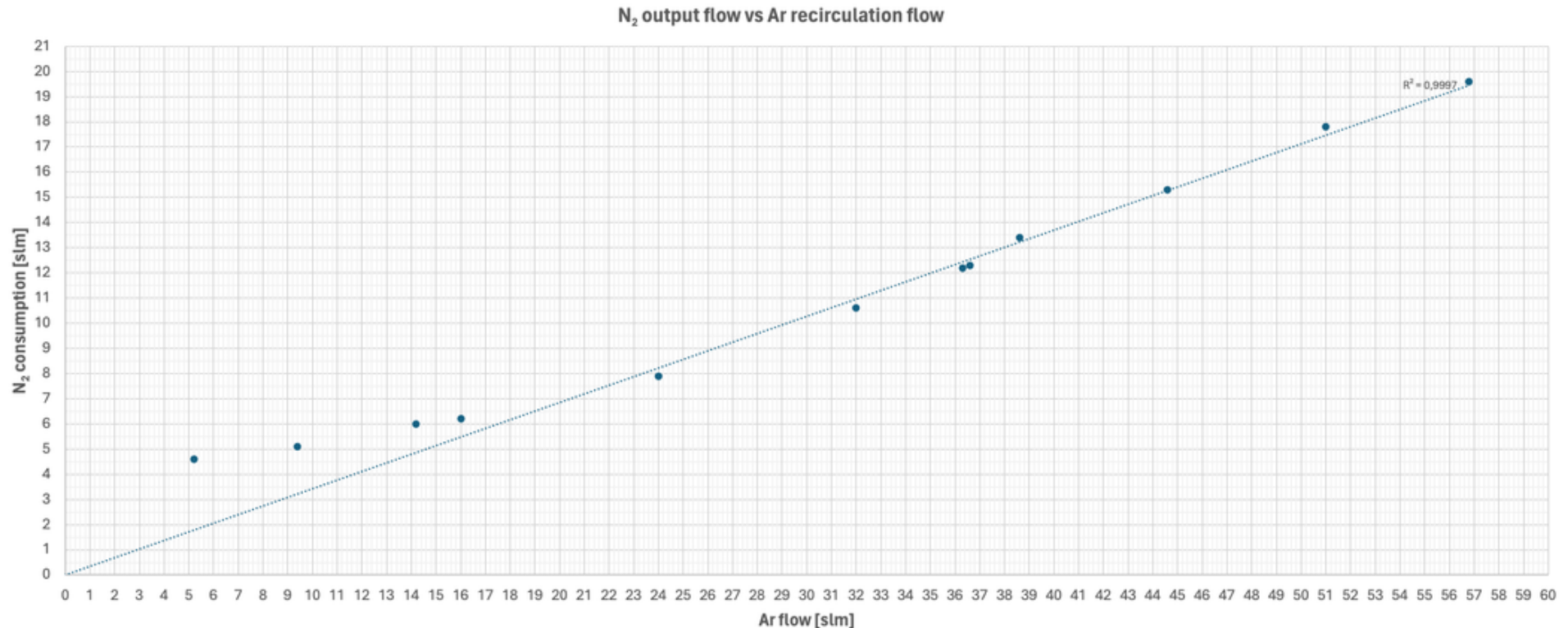
The peak-to-peak maximum variation of 2 mbar and std.dev. of 0.67 mbar



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Calibration of the cryogenic system

Different operating points of the system (recirculation pump speed) in terms of incoming Ar flow and N₂ consumption.*



*data collected at 1090 mbar of pressure in the cryostat kept constant and with LAr level in the cryostat being constant.

Test goals

- AL300 capability to keep the LN level in the condenser with no direct LN fill;
- pressure stability in the cryostat,
- Optimization of the cryostat cooldown and fill phases;
- Measurement of the maximum fill speed;
- Better understanding of Ar condenser thermodynamics;