Results of LArGe cryostat cooling tests

S. Schönert, H. Strecker, G. Zuzel

MPI für Kernphysik, Heidelberg

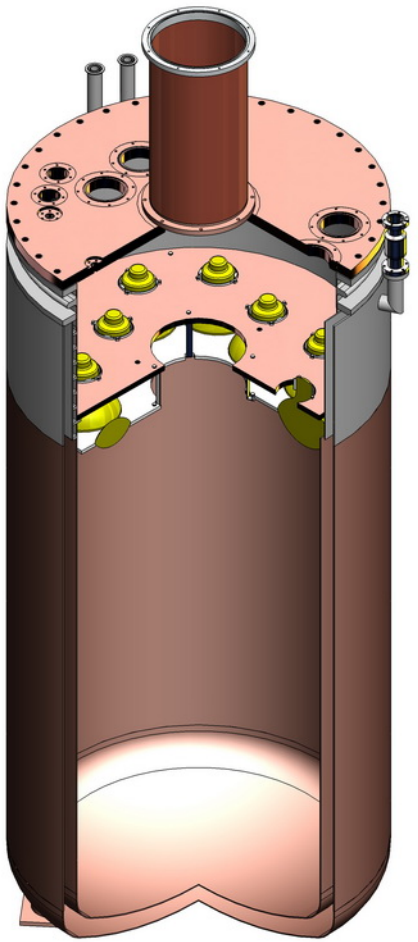
Outlook

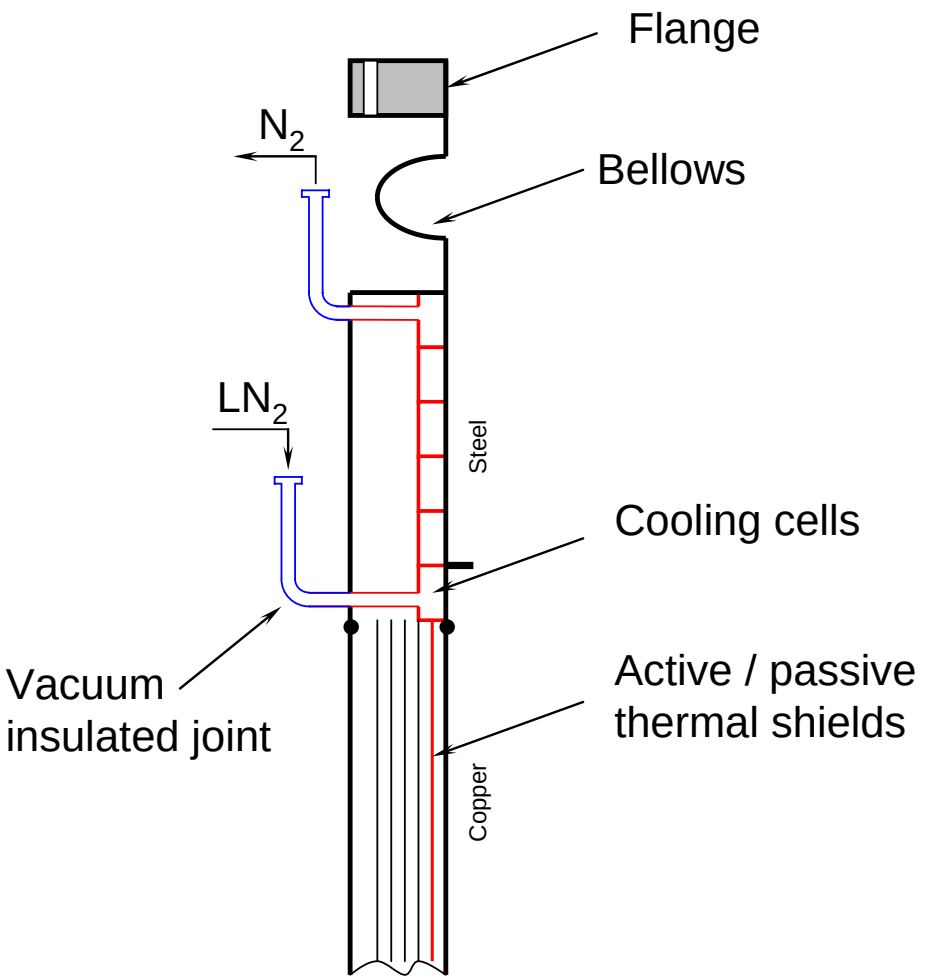
- Design of the LArGe cryostat
- Active cooling concept
- Evaporation/cooling tests
- Summary

Design of the LArGe cryostat

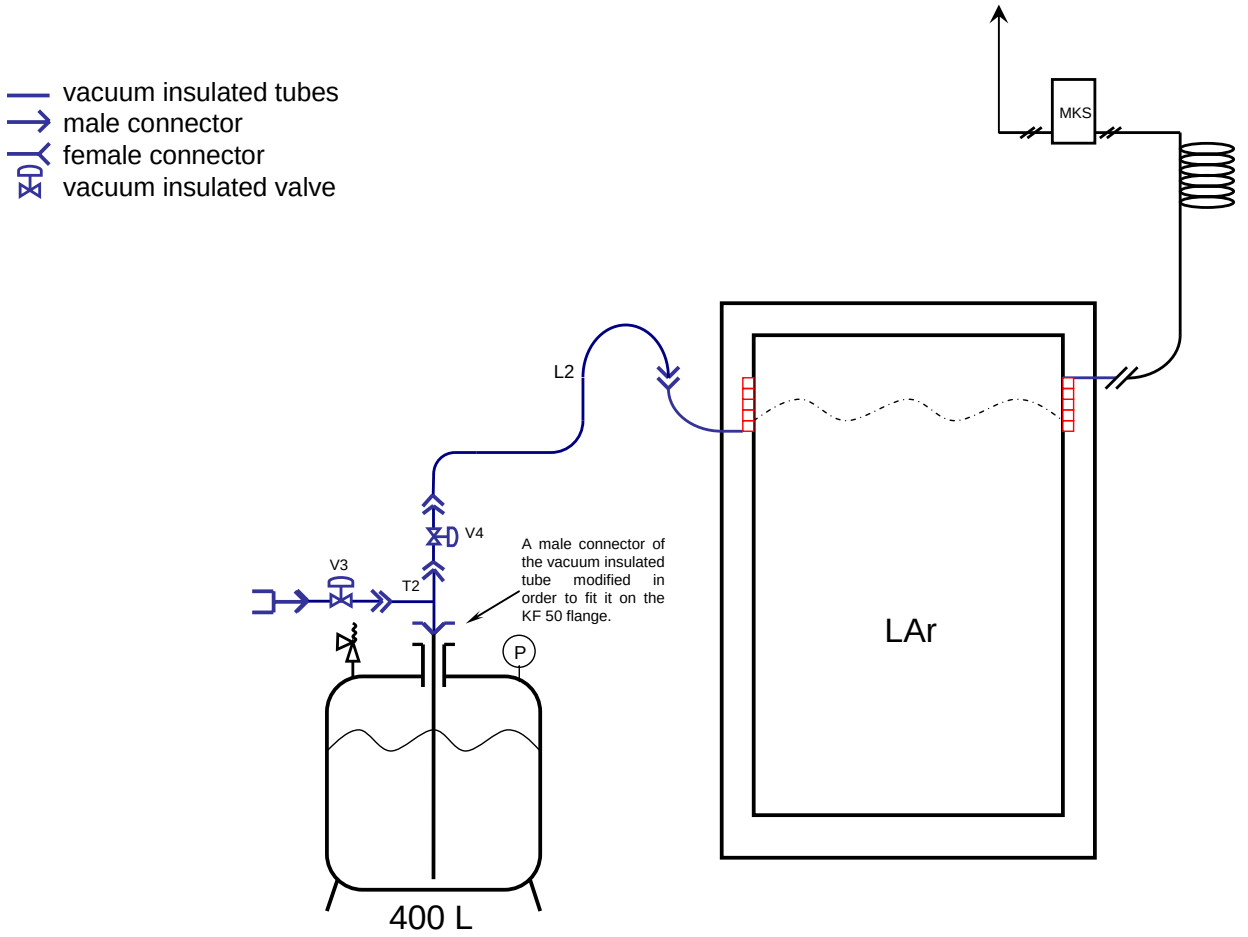
- LArGe to be installed in the GDL
- The cryostat will contain ~1.5 t of LAr
- Tests of Ge detector strings and anticoincidence technique using LAr scintillation
- Active cooling system (LN_2) is foreseen

Design of the LArGe cryostat

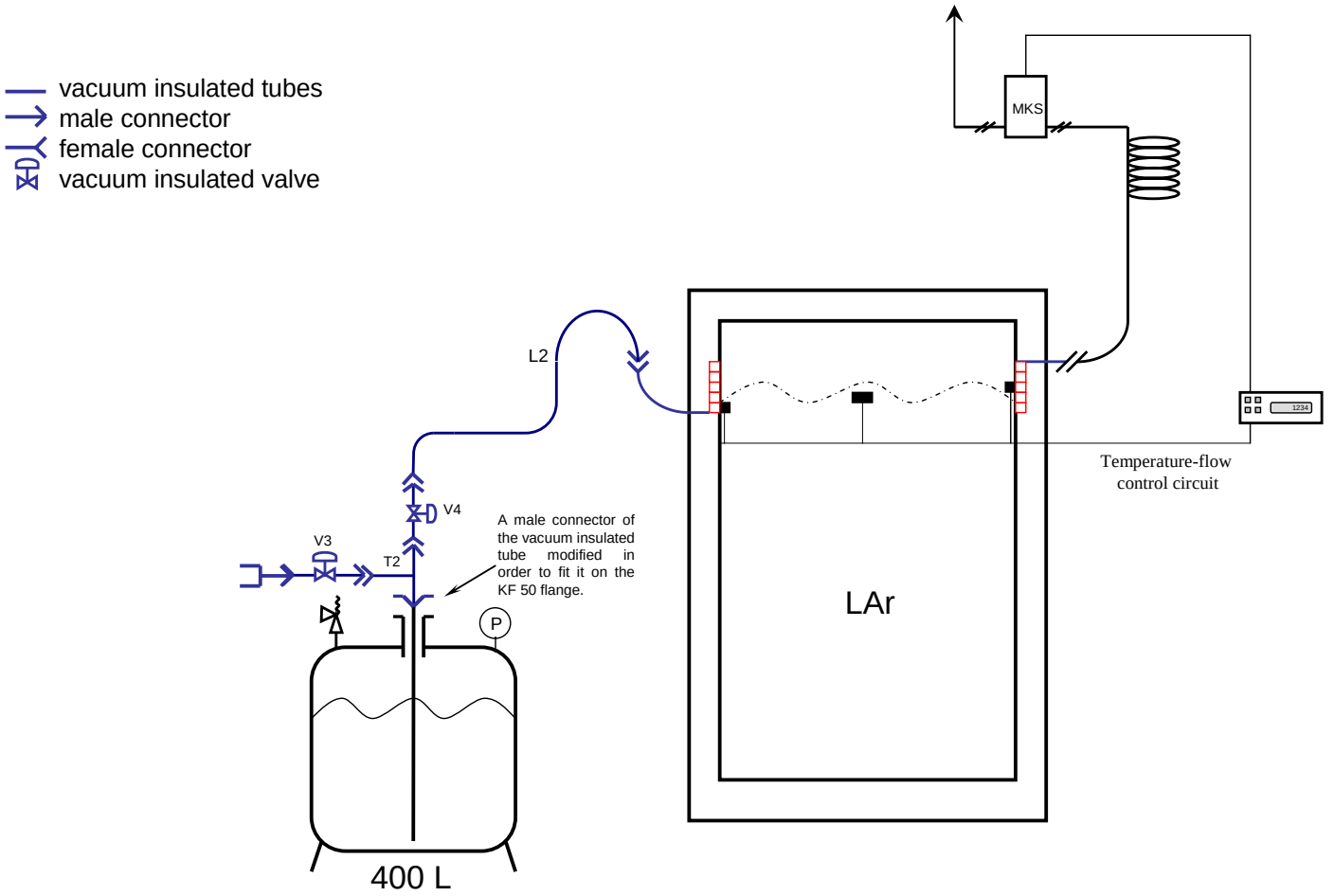




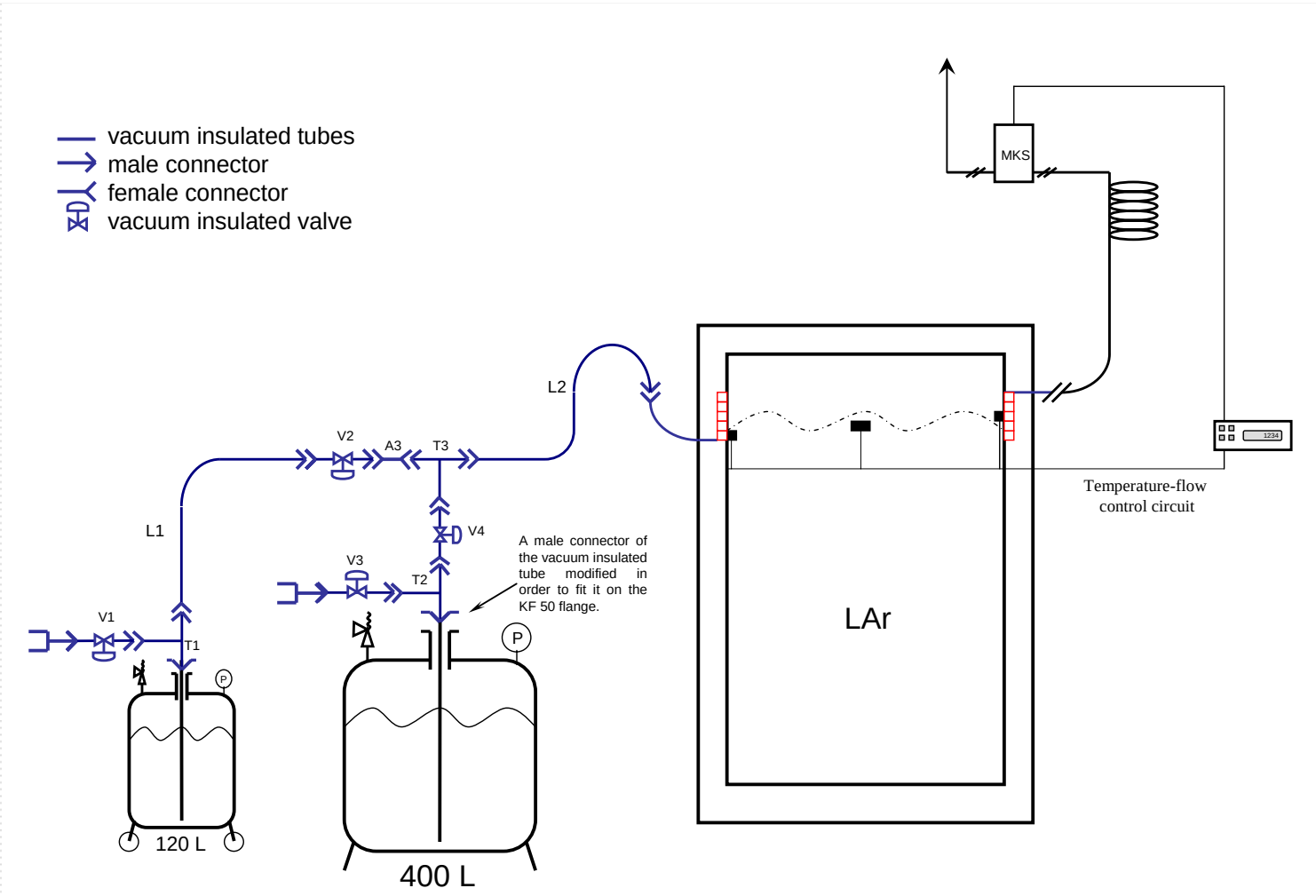
LN_2 supply (active cooling)



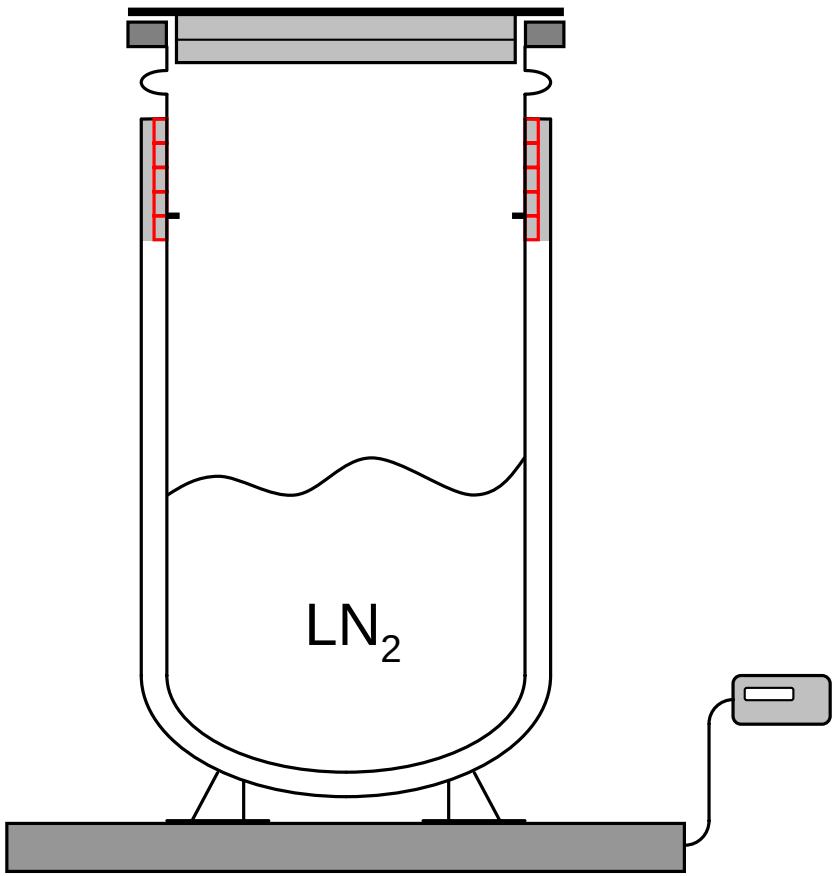
LN_2 supply (active cooling)



LN_2 supply (active cooling)



LN_2 evaporation test

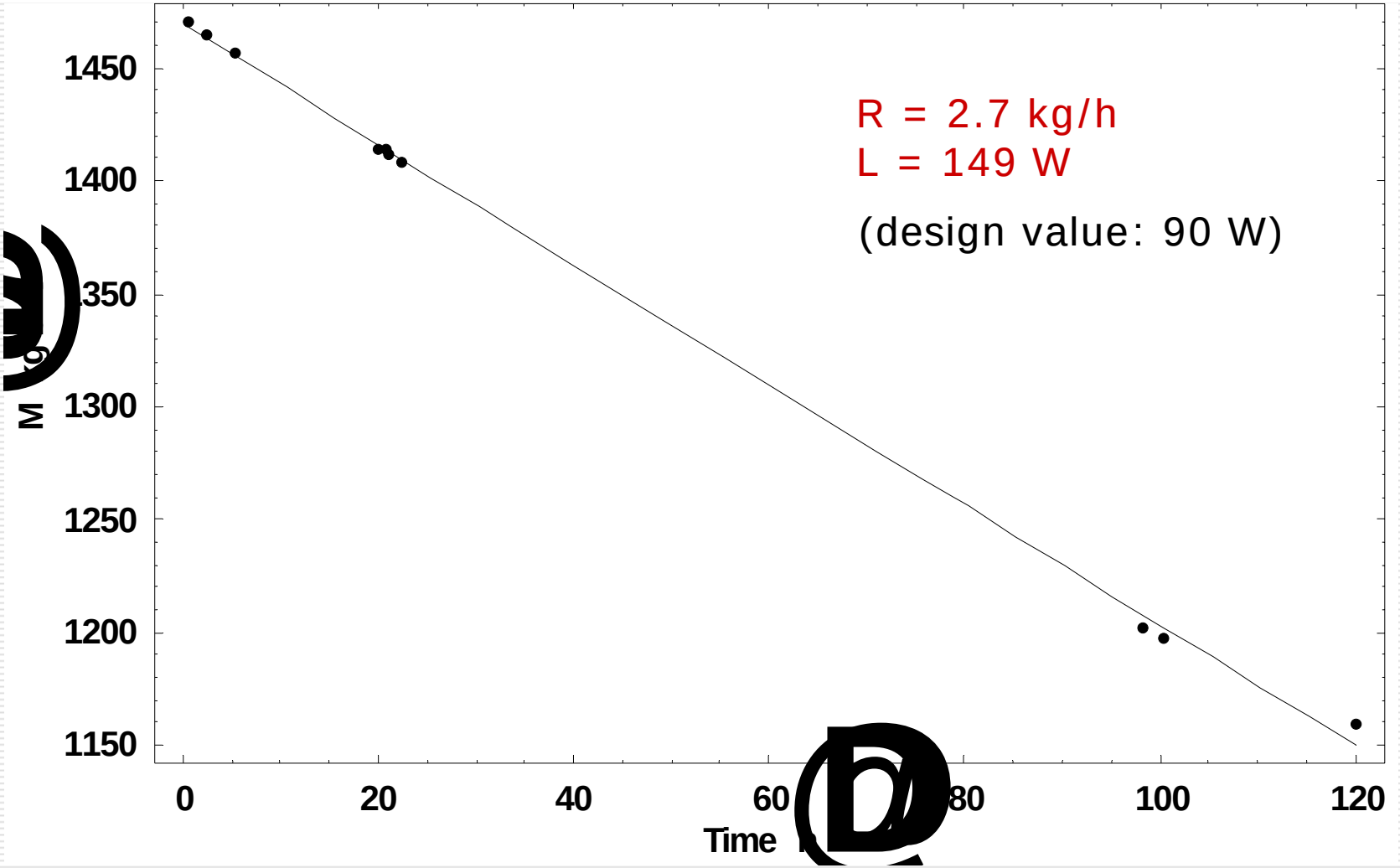


- Cryostat filled with LN_2, no active cooling, insulation lid (15 cm foamed polystyrene with a super insulation foil) on the top
- Evaporation rates measured by mass losses (1 kg precision)

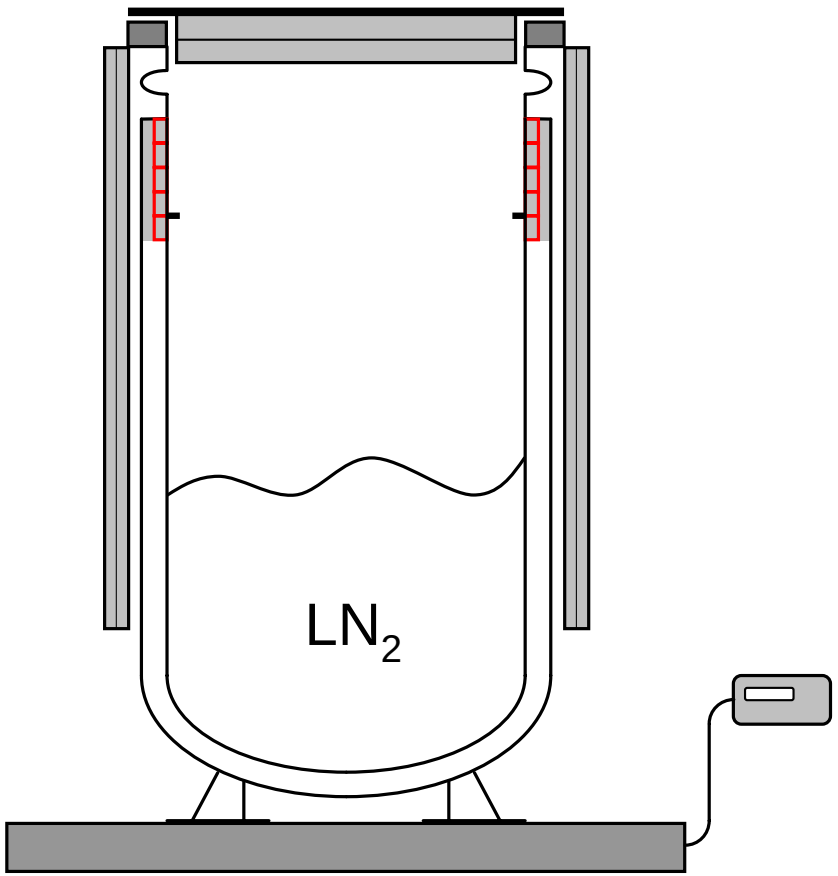
LN_2 level meas. precision: ~2 mm
LAr level meas. precision: ~1 mm

(1 cm of LAr = 8.9 kg)

LN_2 evaporation test



LN_2 evaporation test

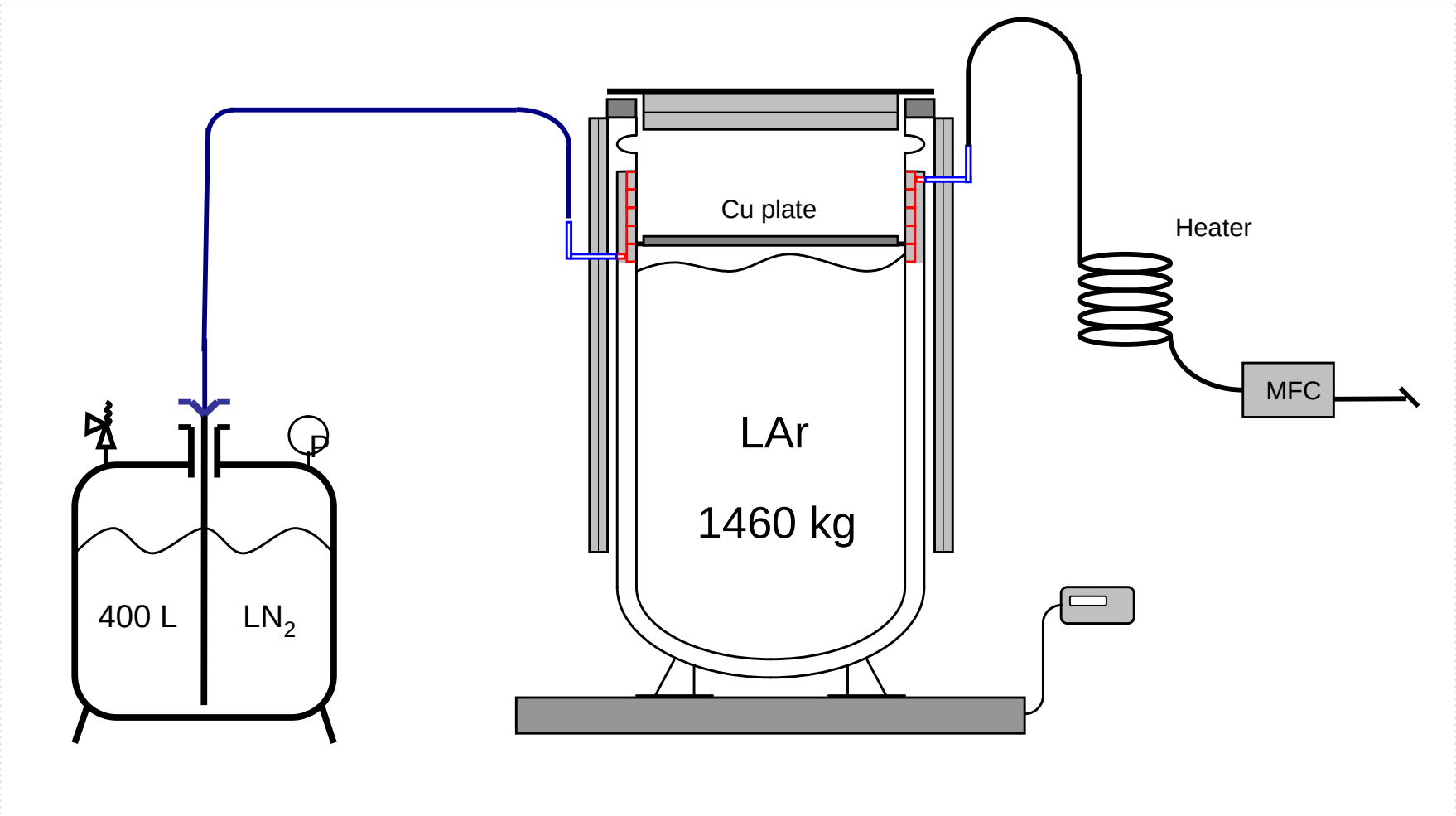


- Additional insulation: foamed polystyrene and super insulation foil, improved lid

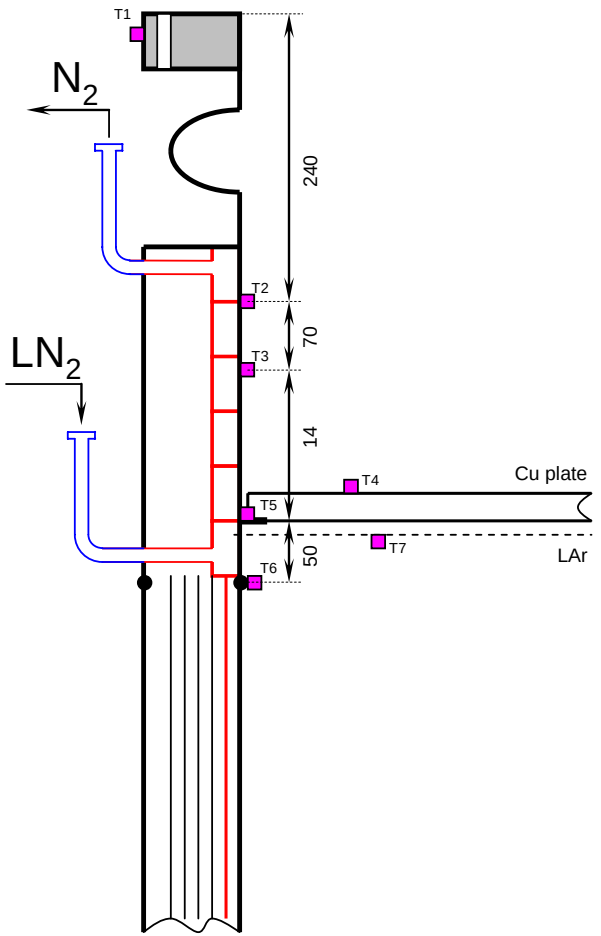
R = 1.4 kg/h
L = 77 W

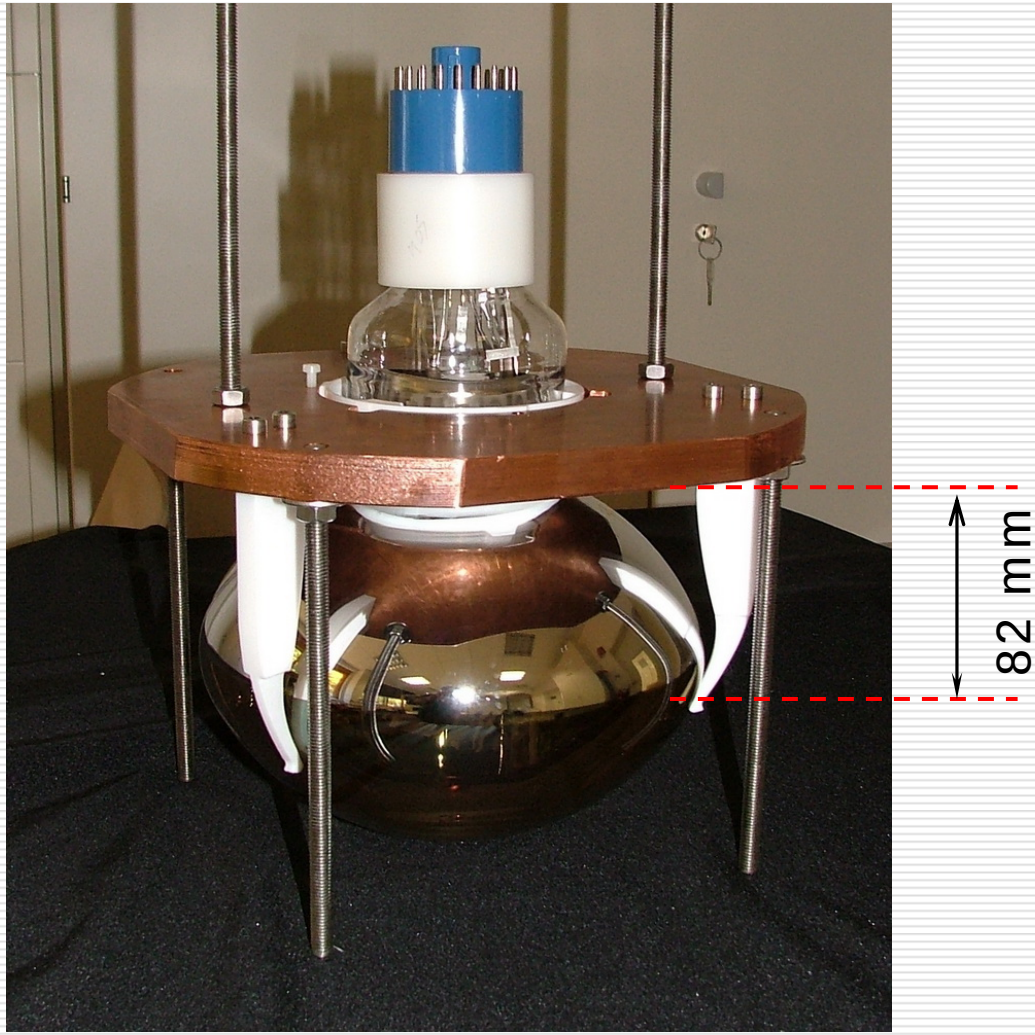
(design value: 90 W)

LAr evaporation: test with active cooling



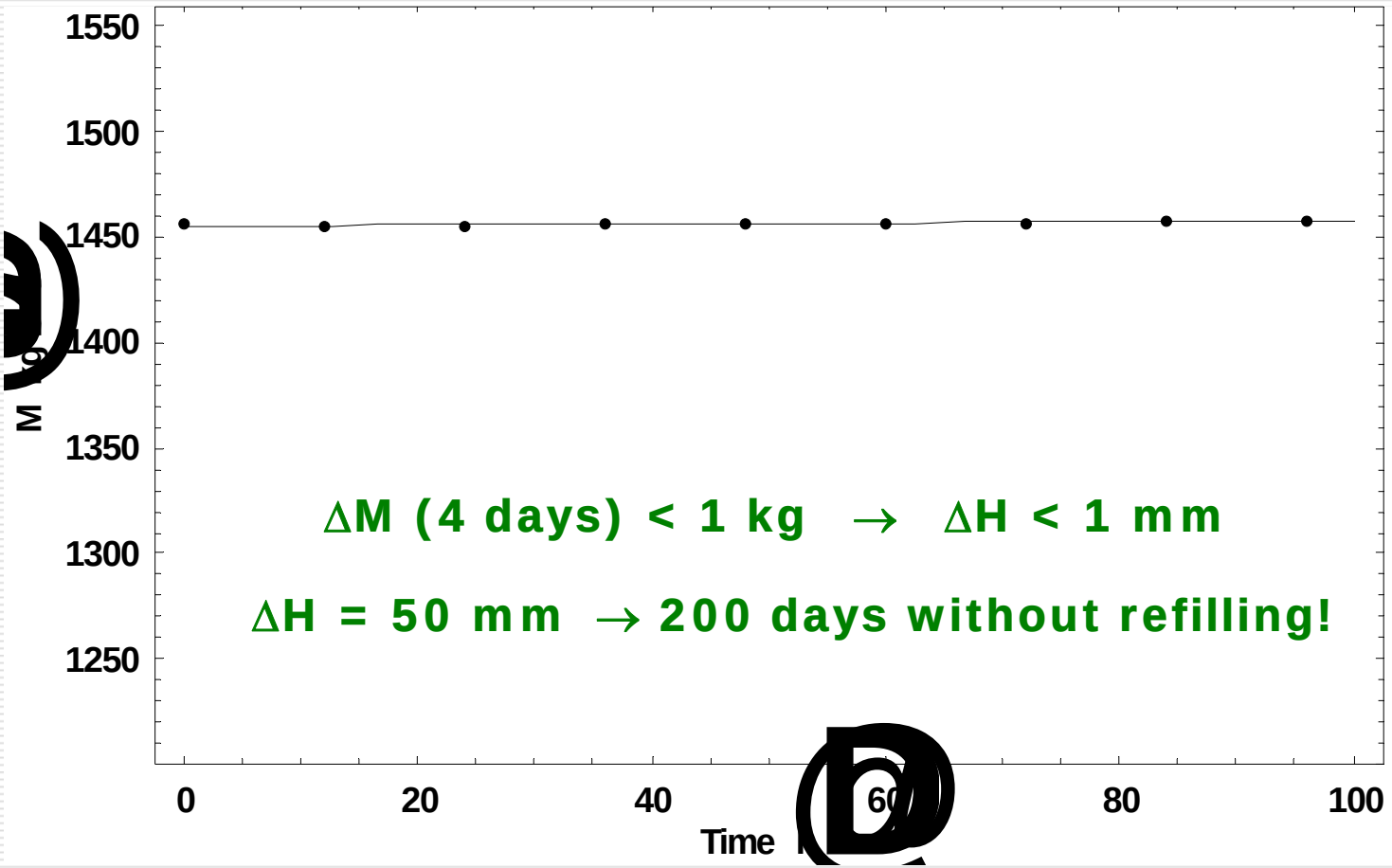
LAr evaporation: test with active cooling





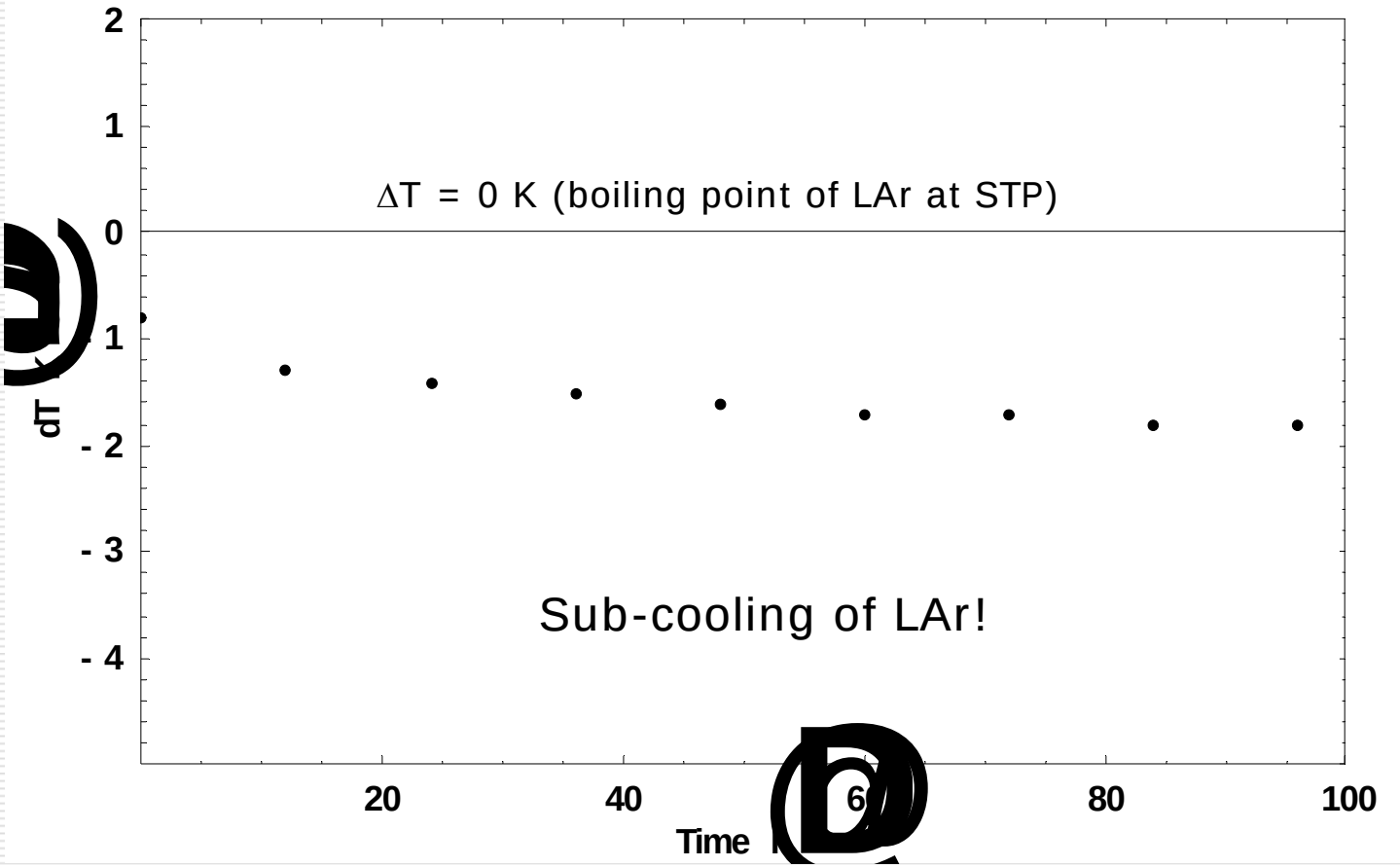
LAr evaporation: test with active cooling

LAr mass loss at F_{LN2} = 2.0 kg/h (1.6 m^3/h)



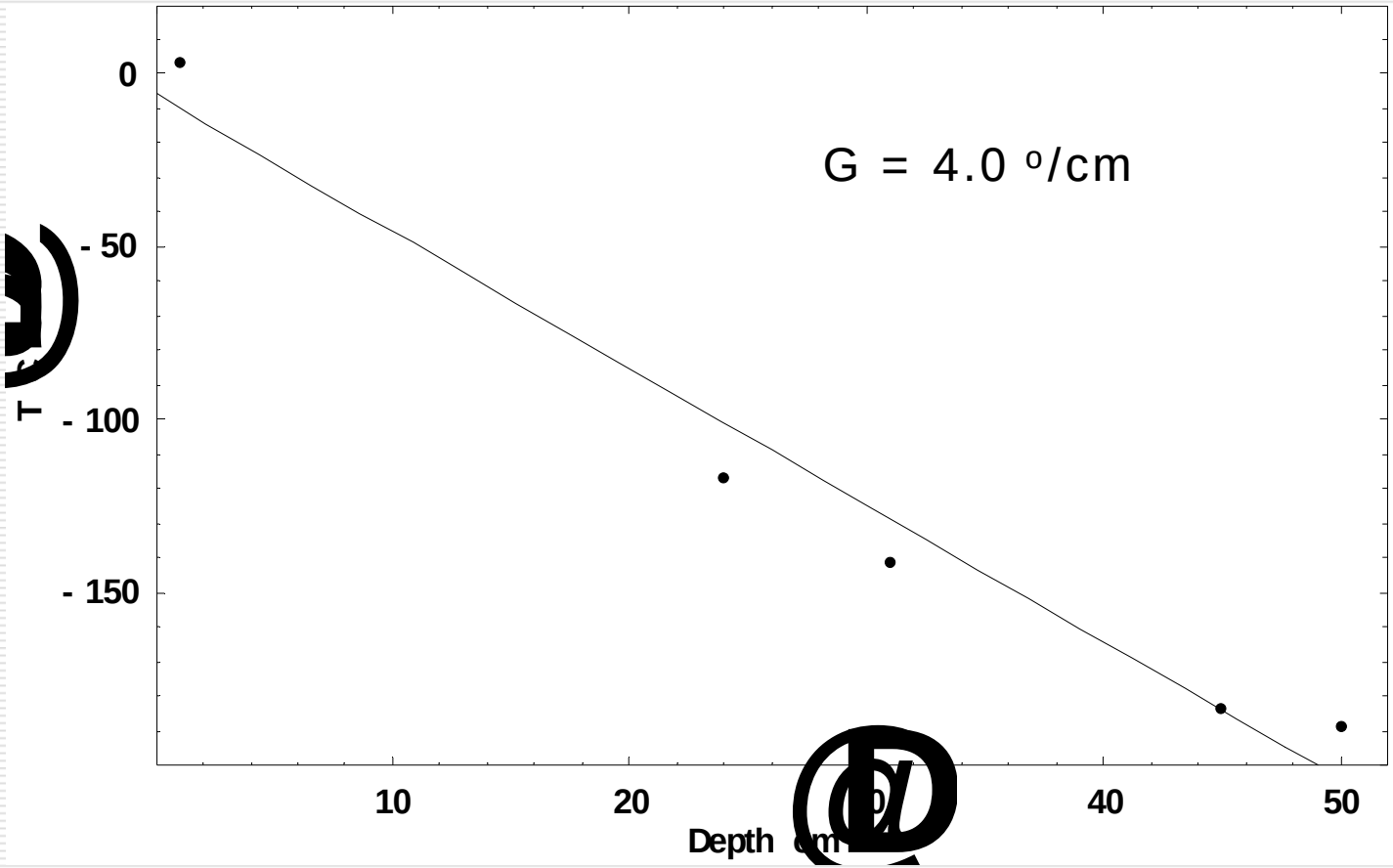
LAr evaporation: test with active cooling

T7 (LAr temperature on the surface) as a function of time at nitrogen flow of F_{LN2} = 2.0 kg/h (1.6 m³/h).



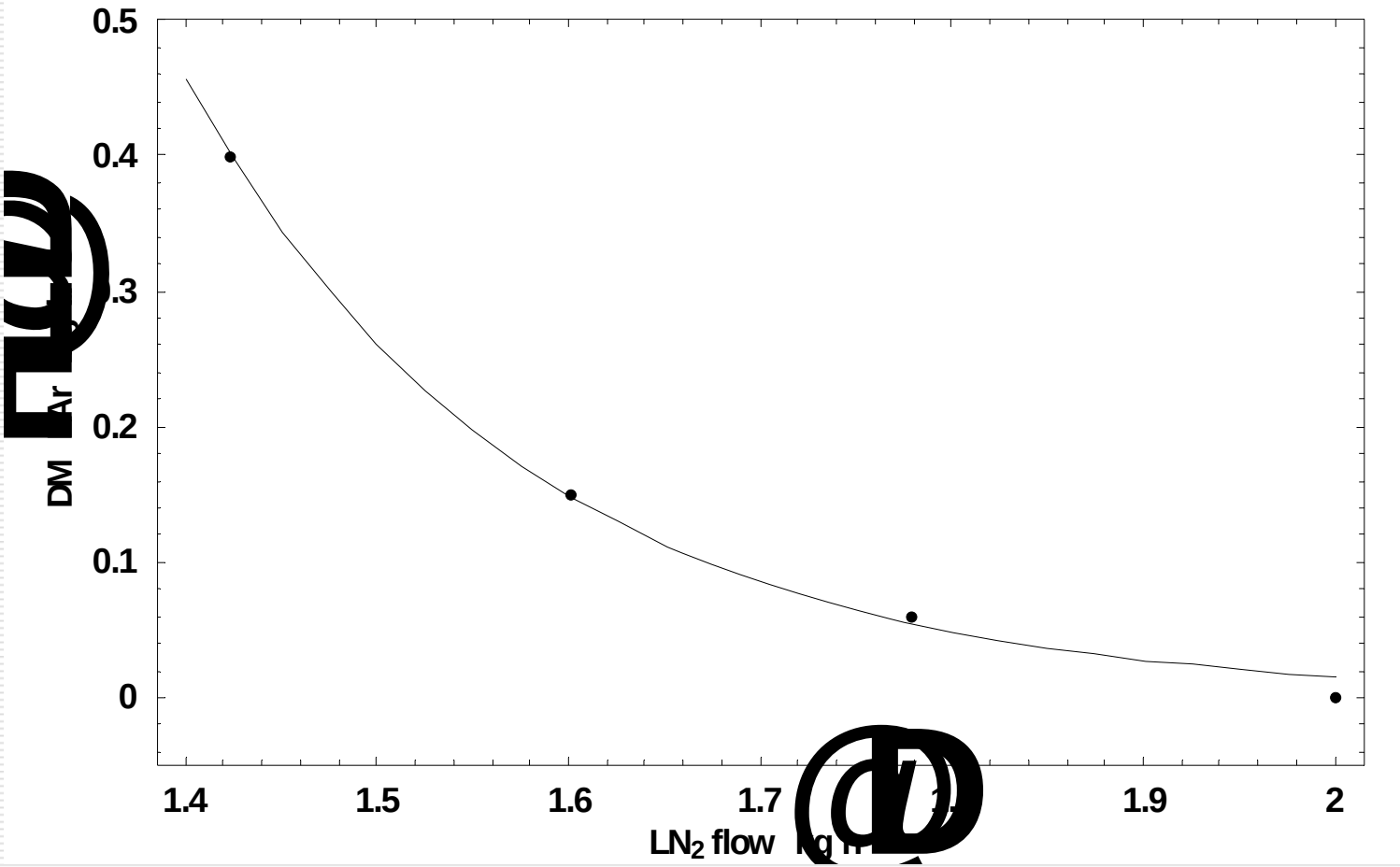
LAr evaporation: test with active cooling

Temperature gradient along the neck



LAr evaporation: test with active cooling

LAr losses for different LN_2 flow rates



Summary

- Additional inslulation of the LArGe cryostat is desired: foamed polystyrene under investigation (^{222}Rn emanation, Ge-spectroscopy)
- Active cooling works as designed, for LN_2 flow rate of 2 kg/h LAr losses are negligible (LN_2 dewar refilling every week)
- Temperature of LAr/neck wall is a very good indicator of the needed/actual cooling power
- Vacuum insulated parts are ordered
- LAr purification/refilling system almost ready
- Installation at GS early next year (?)