Prototype detector testing in liquid argon
(underground summer)

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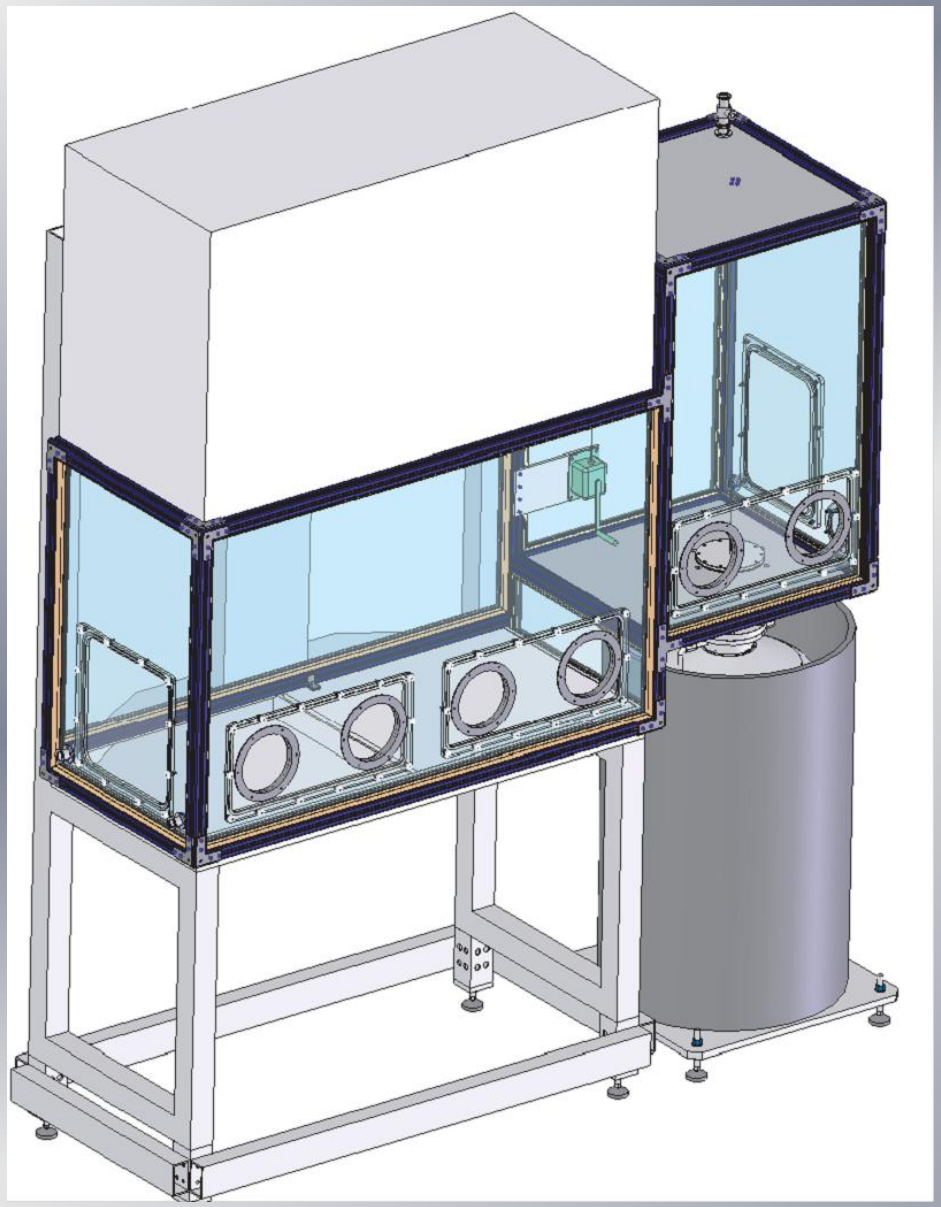
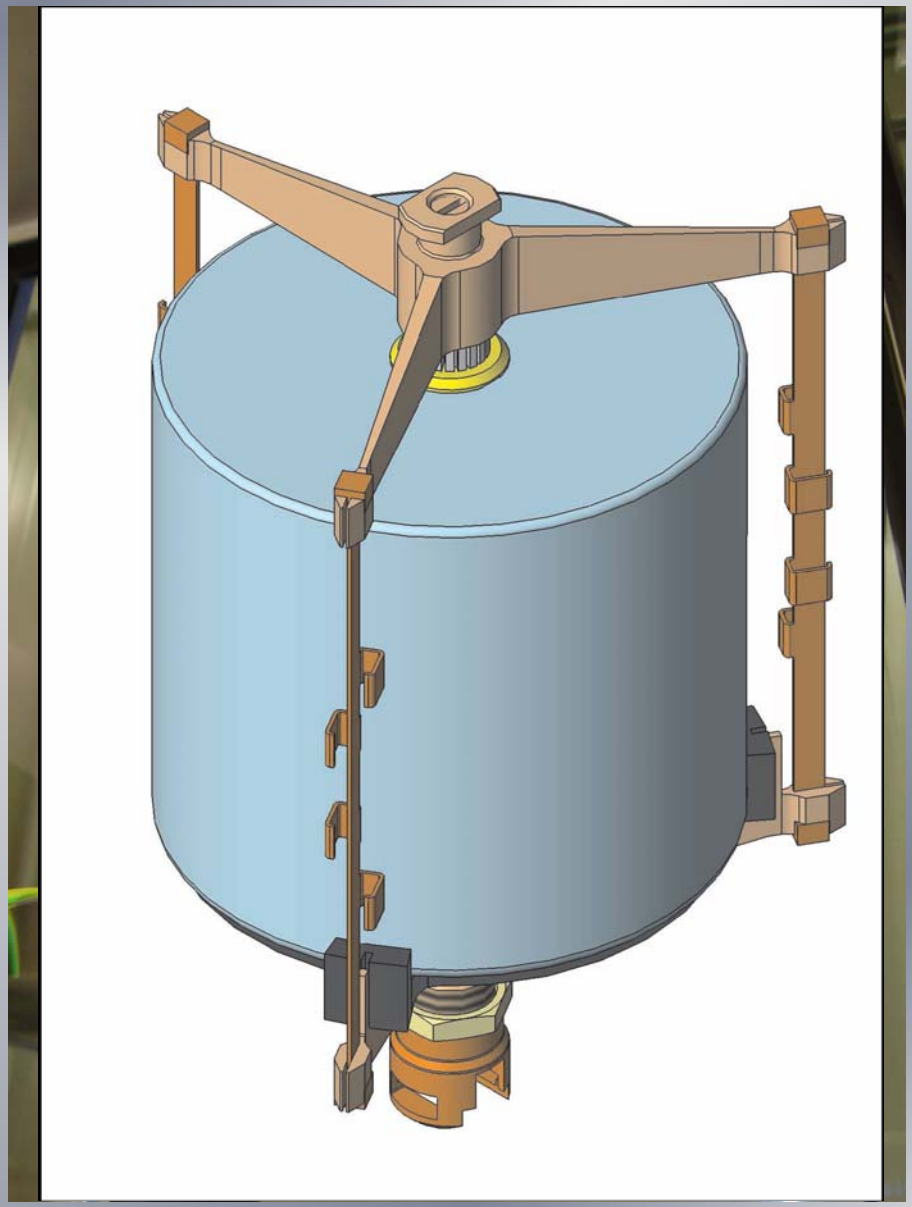
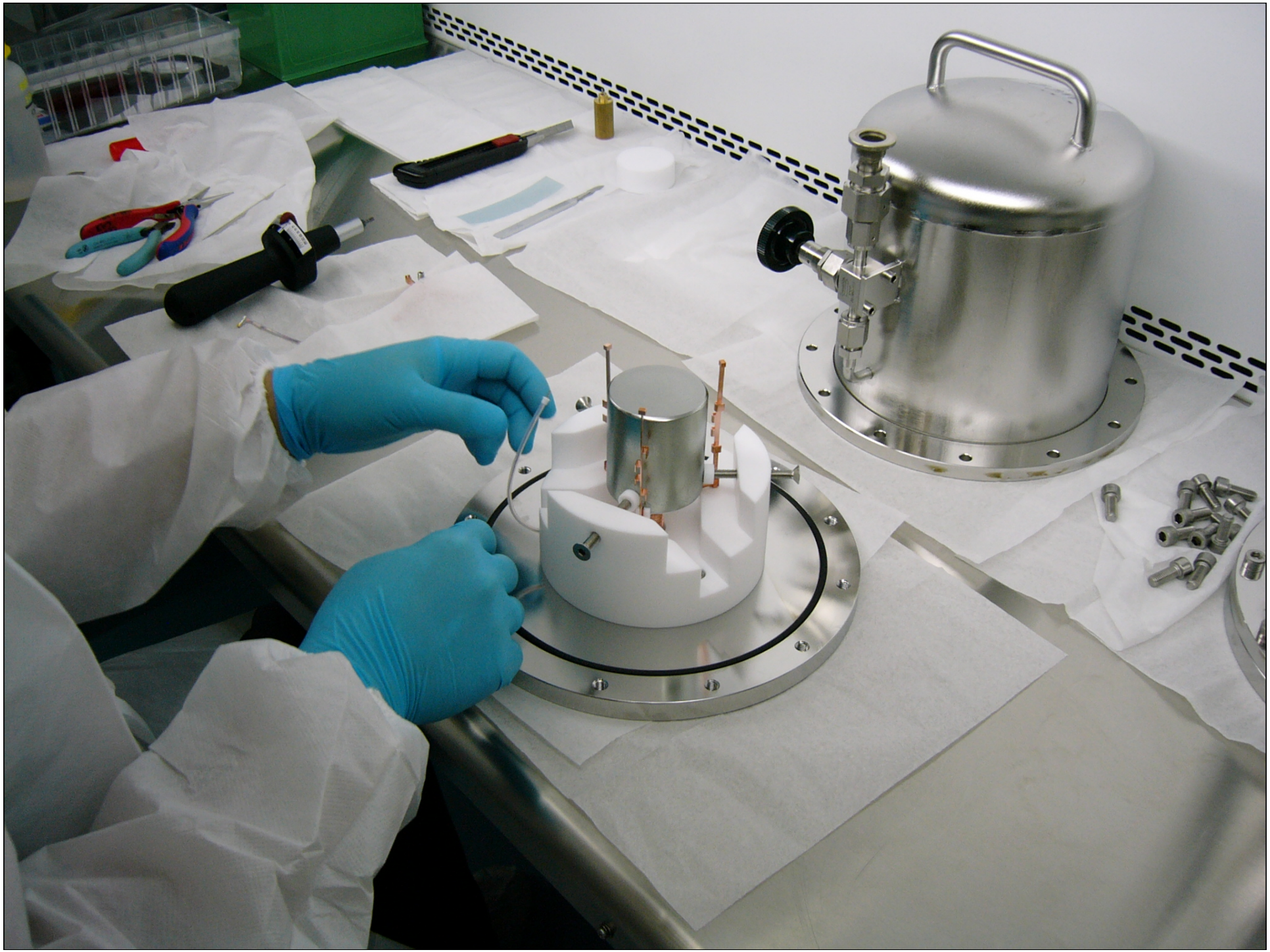
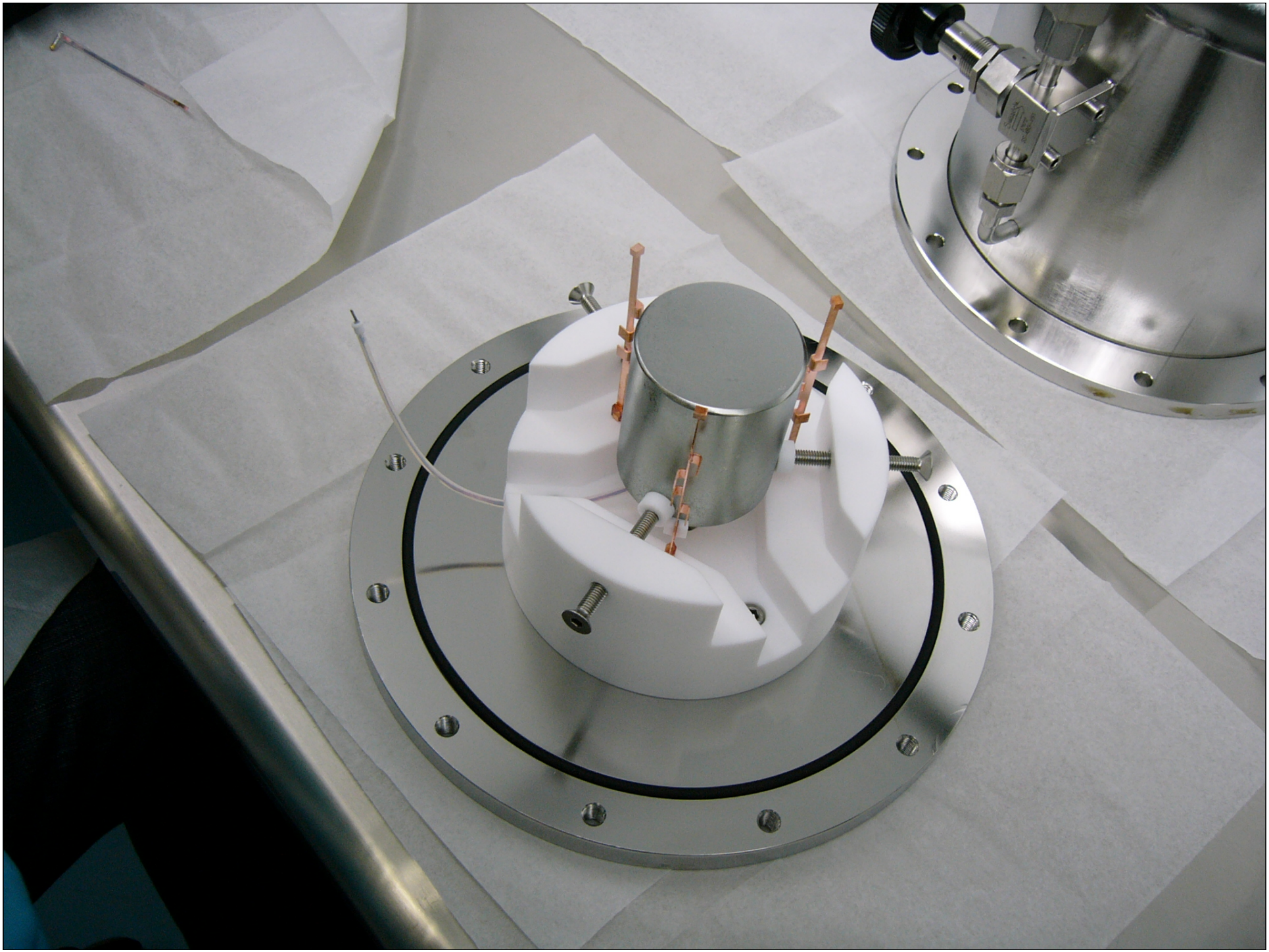
Goals of summer measurements

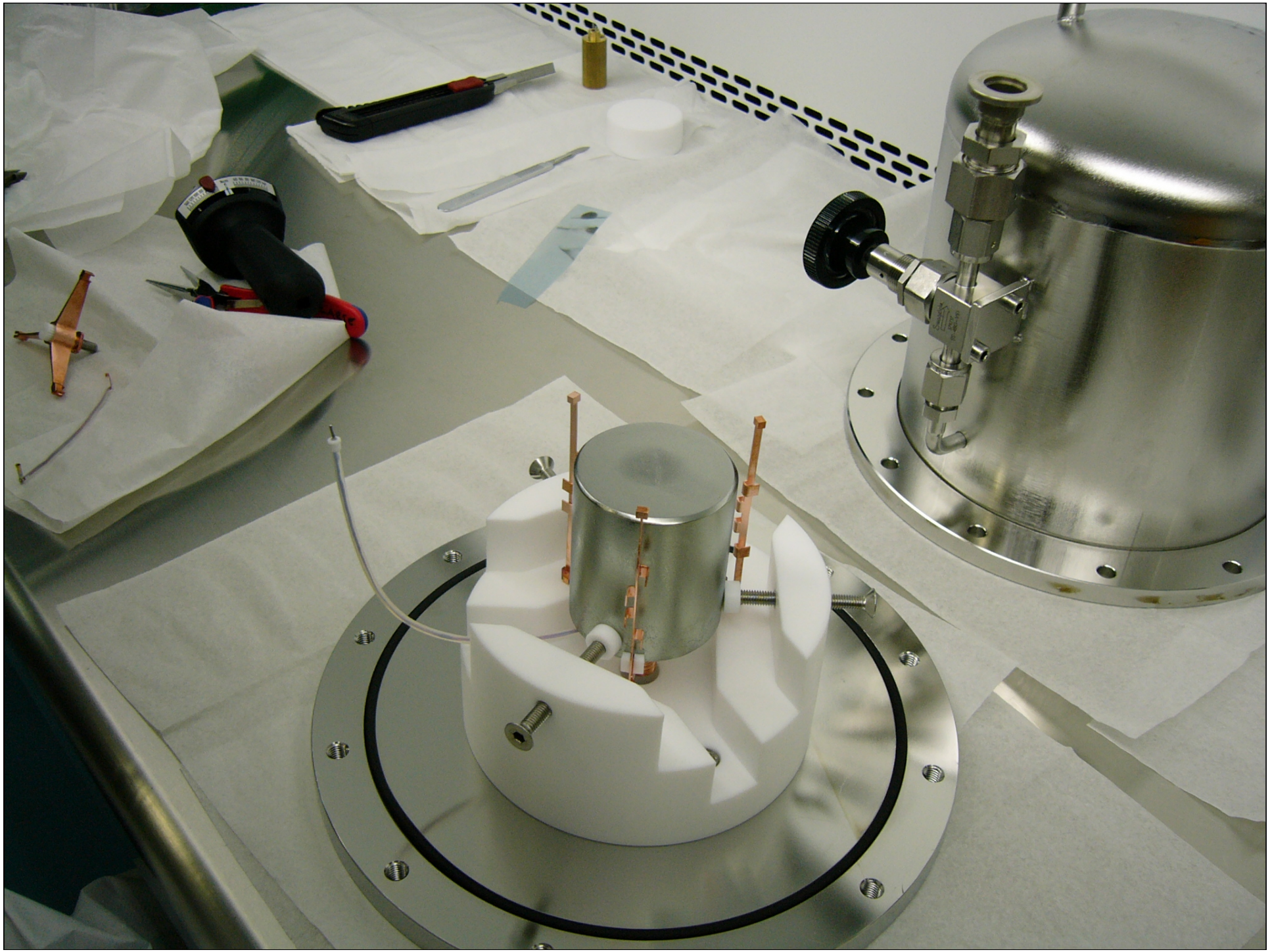
- Investigation of prototype inside LAr:
  - Quality of contacts
  - Leakage current
  - Refill operations of the dewar
  - Long-term measurements

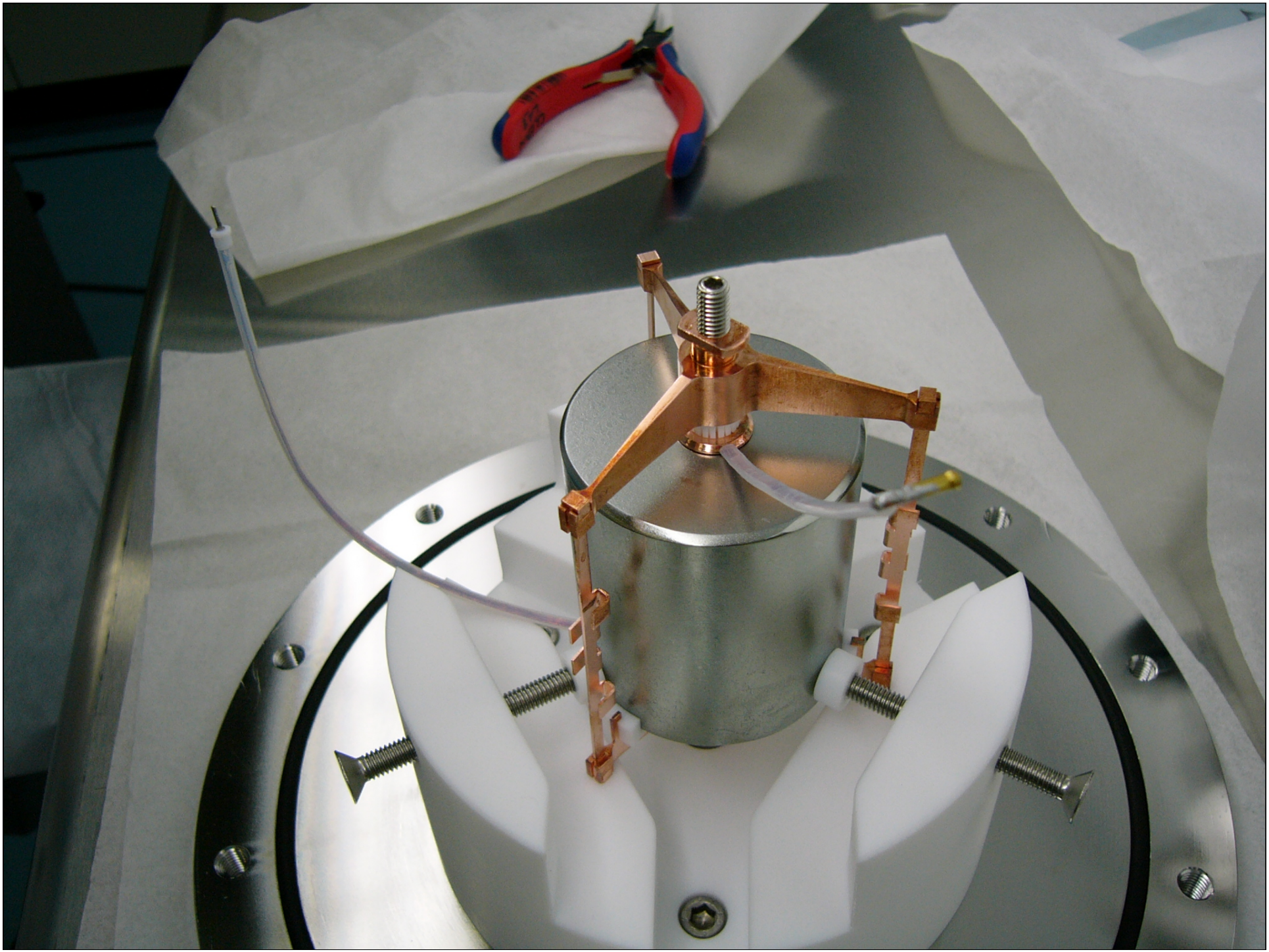






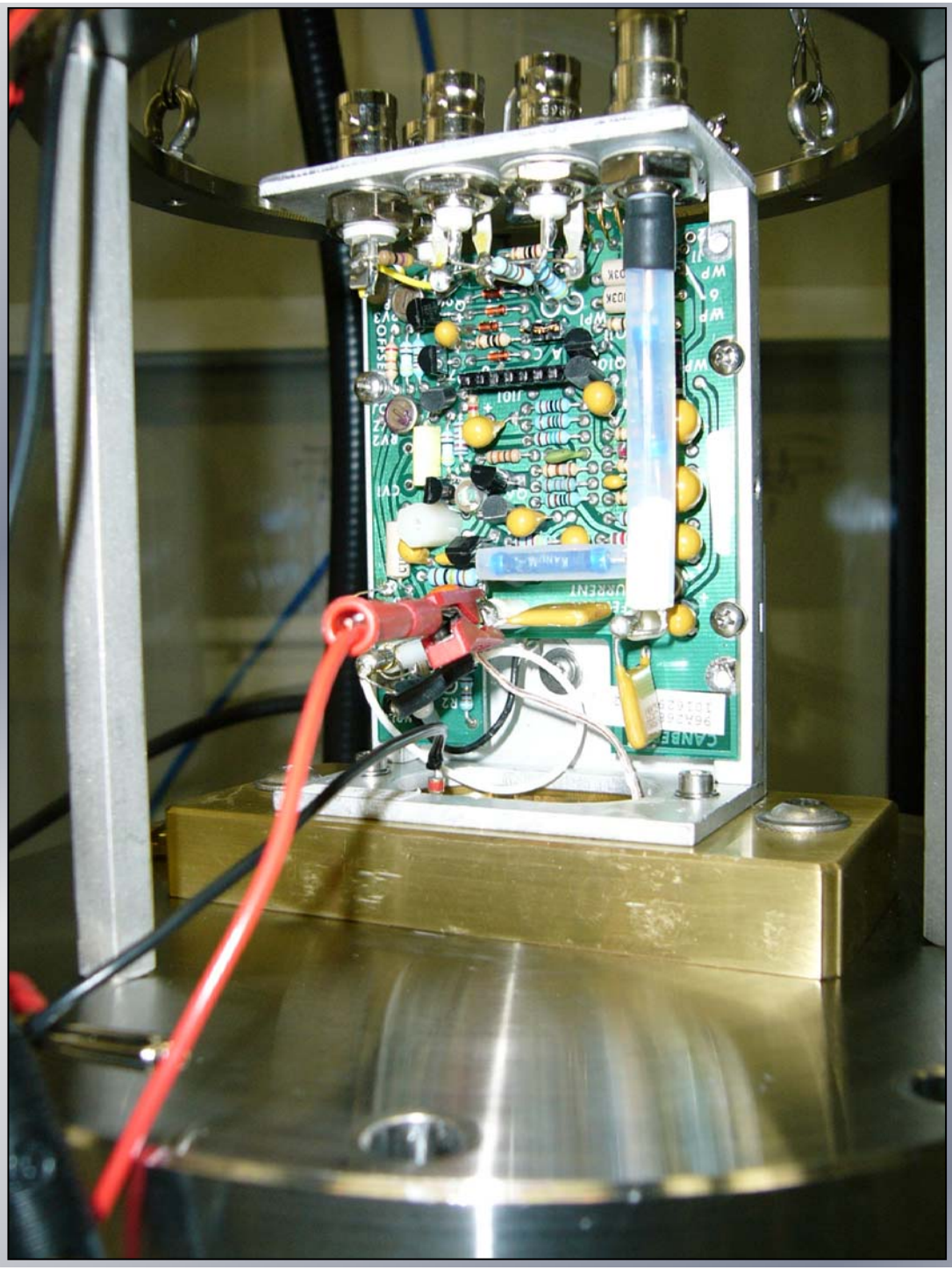






Problems
(in order of appearance)

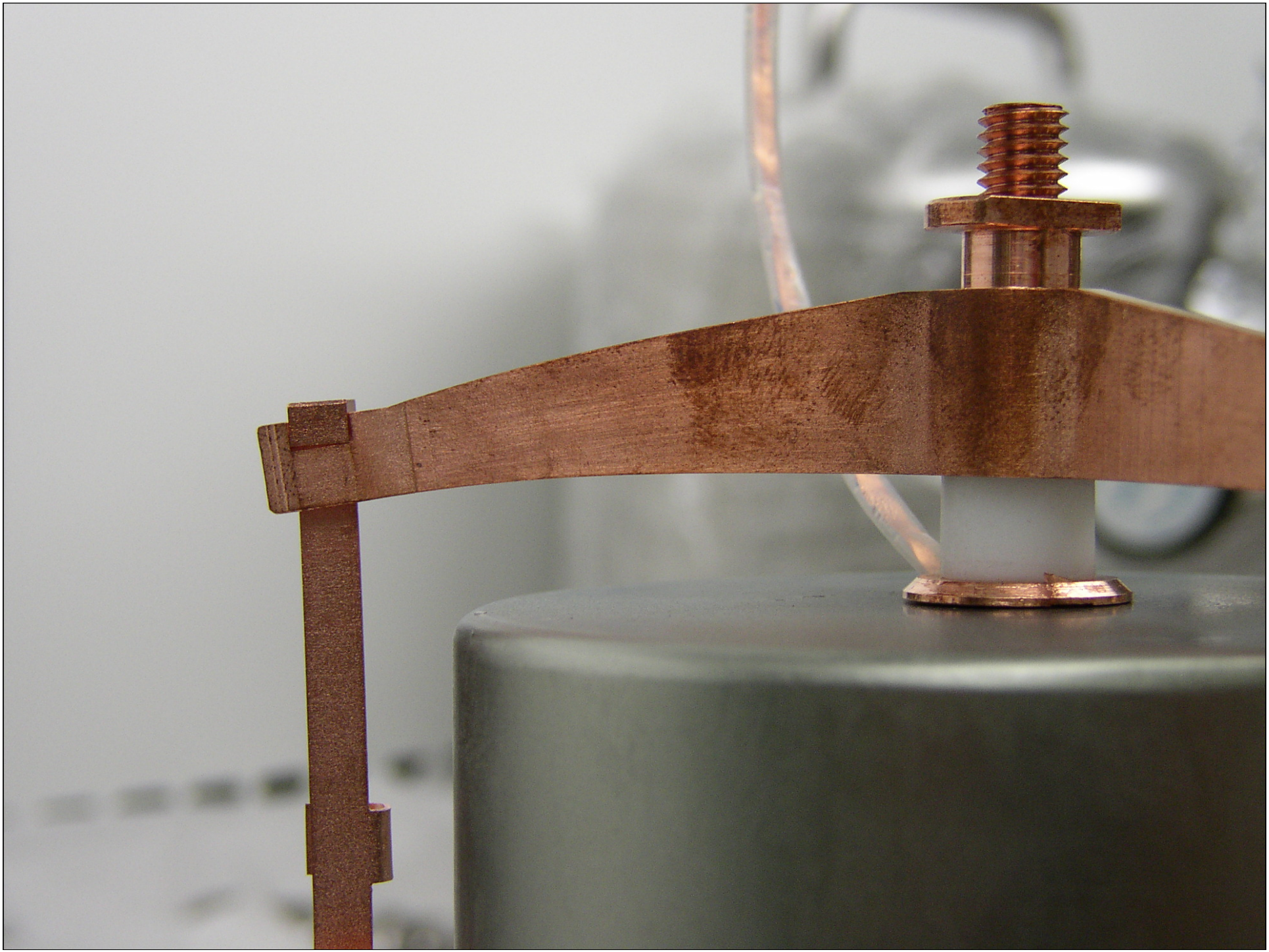
1. Breakdown in argon gas (not liquid!!!) after 2000 V



Problems
(in order of appearance)

1. Breakdown in argon gas after 2000 V

2. Bending of support



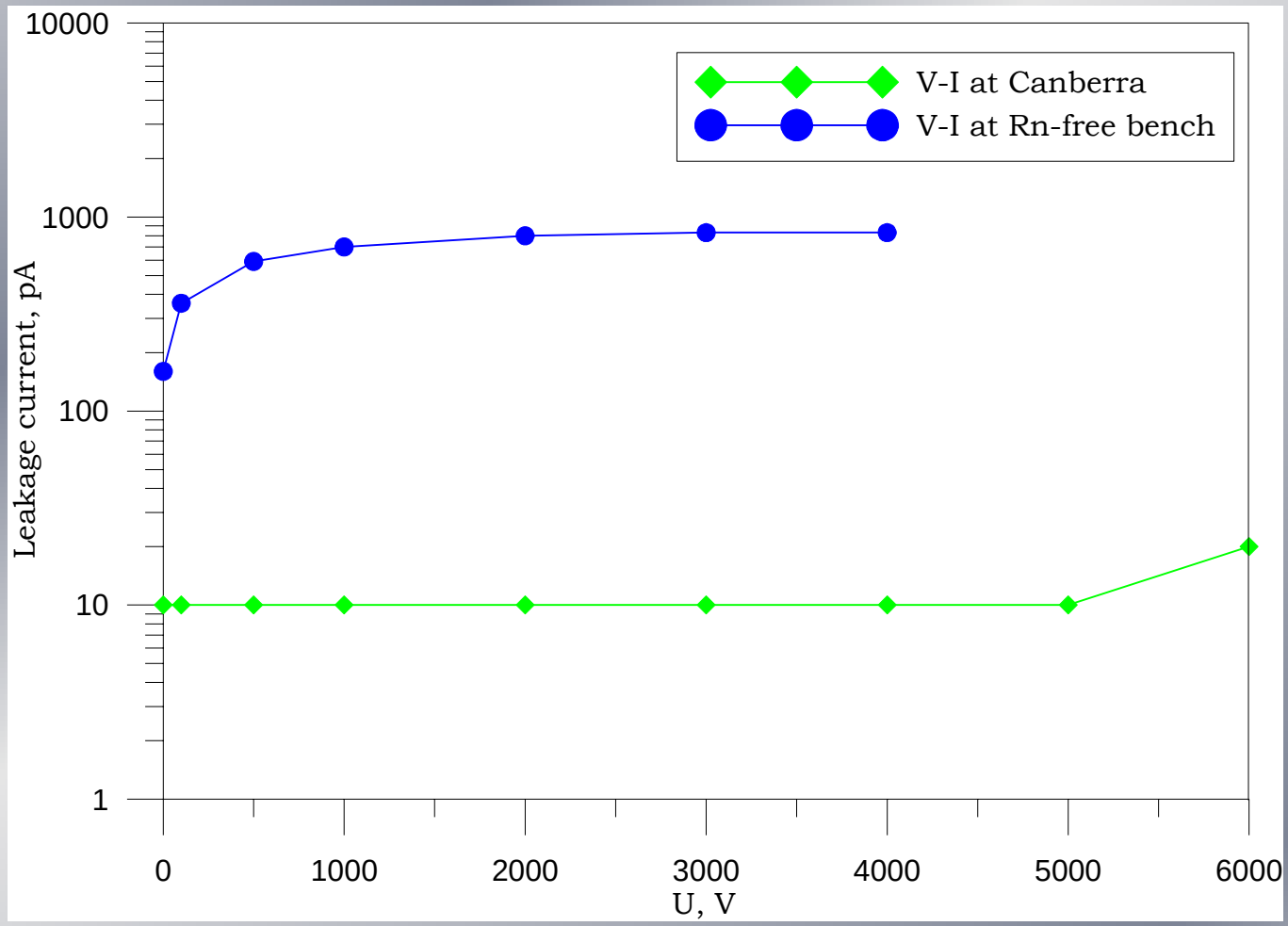
Torque, N×cm	R_{RT}, Ω
40	49.8
50	42.7
55	38.3
60	37, but bending

Problems
(in order of appearance)

1. Breakdown in argon gas after 2000 V
2. Bending of support
3. Increase of leakage current after 25th cycle

Refurbishment of detector

(new implantation and passivation)



Problems
(in order of appearance)

1. Breakdown in argon gas after 2000 V
2. Bending of support
3. Increase of leakage current after 25th cycle
4. Increase of forward resistivity

Normal signal contact before refurbishment:

- At room temperature: R_{RT} ~ 60 Ω
  At liquid argon temperature: R_{LAr} ~ 2 kΩ

After refurbishment with soldered signal contact:

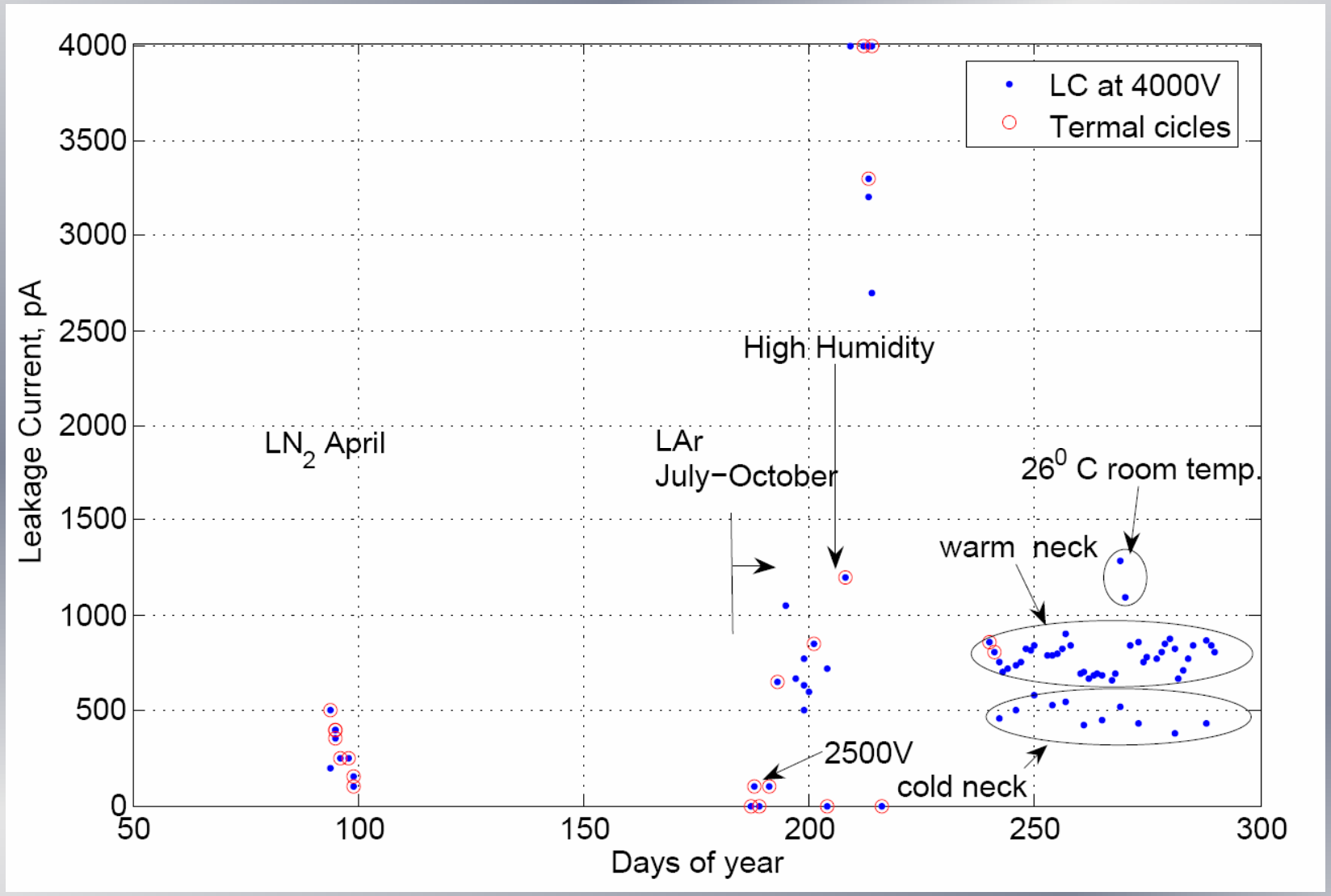
- **First immersion**
  - R_{RT} = 39 Ω R_{LAr} = 2.7 kΩ
    U = 4000 V → I = 800 pA → FWHM = 3,7 keV

- **Second immersion**
  - R_{RT} = 35 Ω R_{LAr}= 10 κΩ
    U = 4000 V → I = 800 pA → FWHM = 5.5 keV

- **Third immersion**
  - HV contact on bottom
    R_{RT} = 38 Ω R_{LAr}= 8,5 κΩ
    U = 4000 V → I = 800 pA → FWHM ~ 4,5 keV

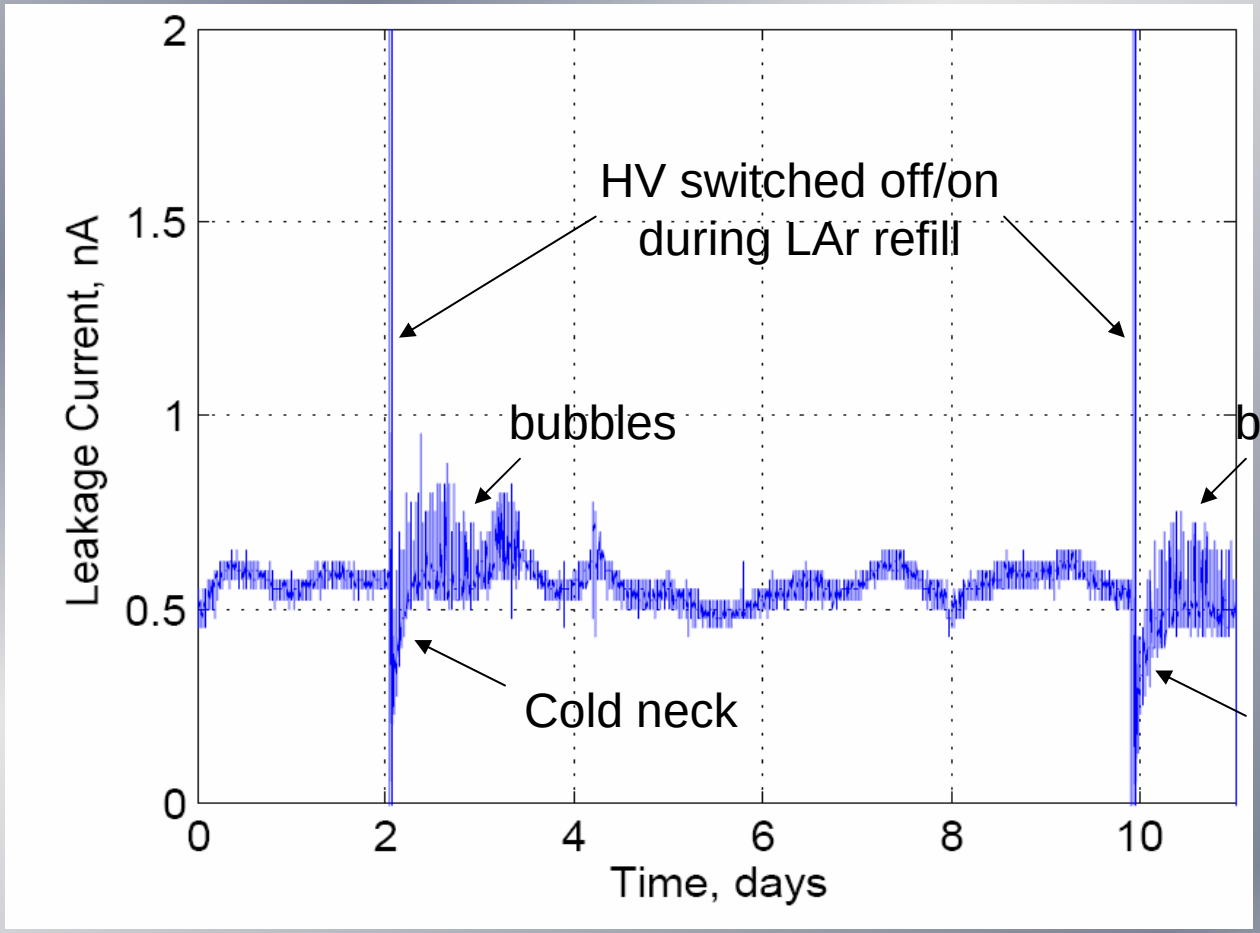
Start of long-term test

Leakage current history of prototype



Leakage current of prototype

Leakage current measured once per minute



Preliminary conclusion

- Breakdown in argon gas – solved
- No other specific argon problems
- Bending of support – solved
- Leakage current was stable during 2 months
- IR shield needed
- Boiling protection needed