

Ongoing activities at INFN Pisa



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LSPE-PI

4 Novembre 2014

OdG

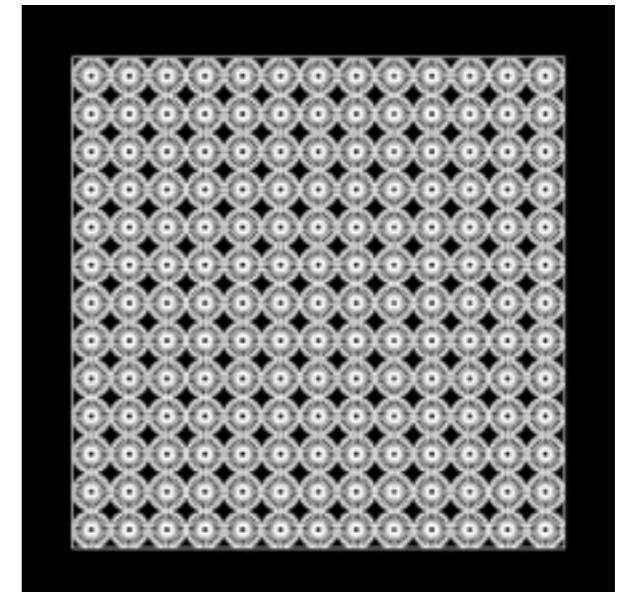
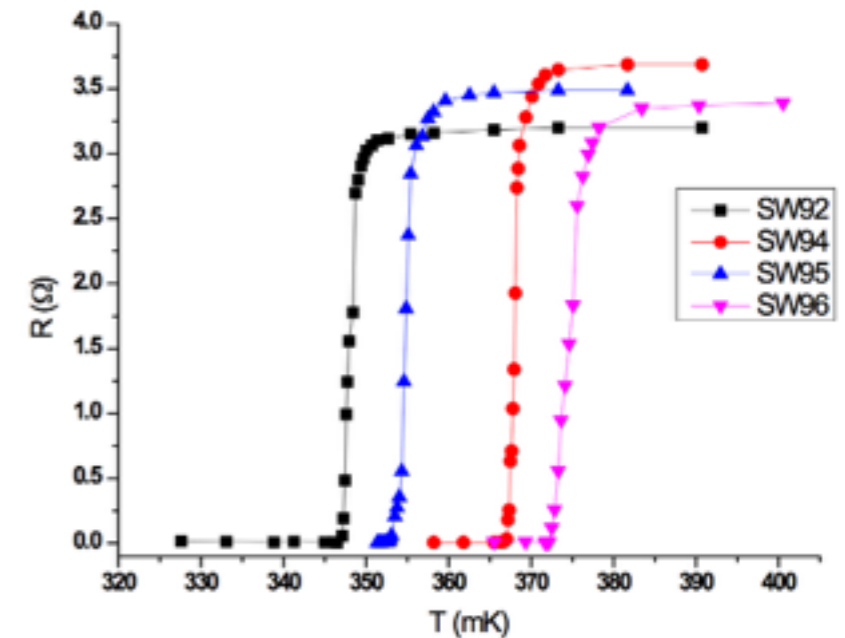
1. Raggi Cosmici
2. Risuonatori
3. FDM
4. Criogenia - Criostato
5. Meccanica di supporto - Riunione Roma 17/11
6. Feed-horns & microwaves
7. varie ed eventuali

Compiti Pisa

- Rilasci di energia cosmici Nov. 15
- Disegno/realizzazione LC Nov. 15
- Layout elettronica sul piano focale Nov. 30
- FDM Nov. 30
- Layout termico-meccanico elettr. Nov. 30

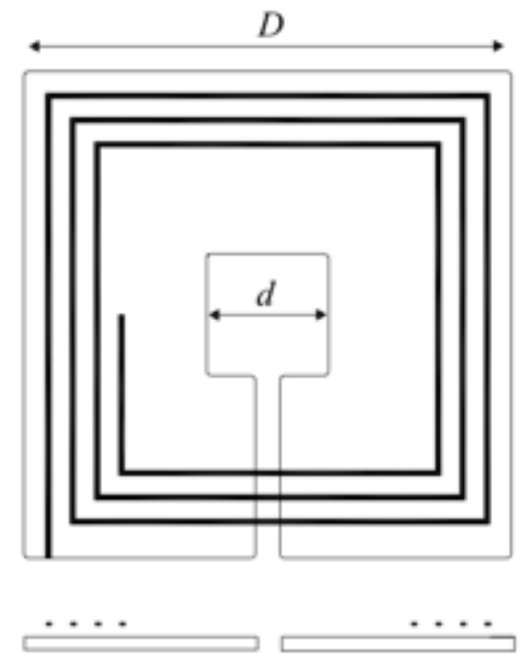
Raggi cosmici

- Quanta energia viene persa dai cosmici in 50 nm di Au
 - manda in transizione il TES
 - larghezza di transizione ~ 2 mK
 - manda in saturazione la dinamica dell'ADC
 - 20 pW \Rightarrow bias ~ 3 μ V a 0.5 Ω
 - range dinamico ~ 1 Ω
- Rilascio d'energia $\Delta E = C \Delta T$
 - $C \sim 9$ pJ/K @ 0.5 Ohm
 - Larghezza della transizione superconduttrice ~ 2 mK
 - $G \sim 0.4 \times 10^{-11}$ W/K per gamba (x16)
- Spettro dei cosmici incidenti su una geometria ragionevole
 - 2 cm Al
 - coni di Al
 - 100 nm Au
 - $E < 1$ keV nel 90% dei casi
 - spettro misurato BESS/modello di Glast con cut-off geomagnetico.



Superconducting inductors

- Inductor following [Jaycox & Ketchen](#) design
 - **superconducting coil** deposited on and insulated from a **slit square** superconducting washer
 - produces **minimal stray magnetic fields** in the plane outside the square washer
 - Very **low mutual inductances** and tight control of inductances



- $L = 1.25 \mu_0 d \times N^2$ ($\mu_0 = 4\pi \times 10^{-7}$ H/m)

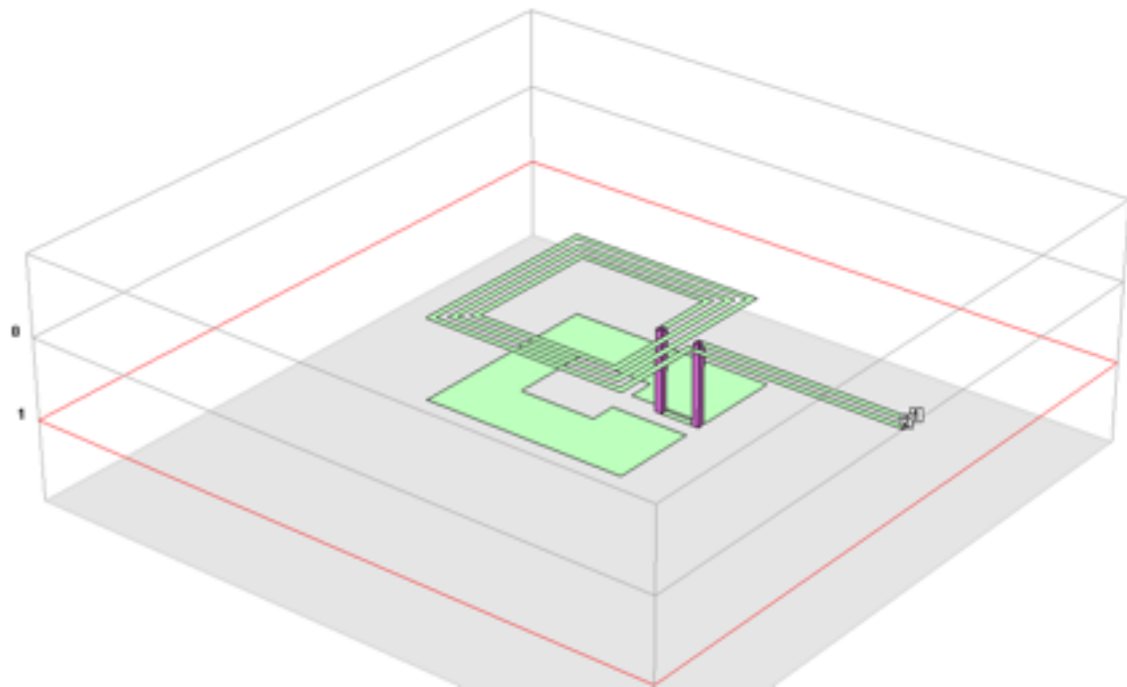
- Banda passante e costante tempo TES

- $1/\tau_{LCR} > 5.8/\tau_{TES}$, $L < R \tau_{TES(Eff)} / 5.8$
- 200 kHz \rightarrow 1 MHz

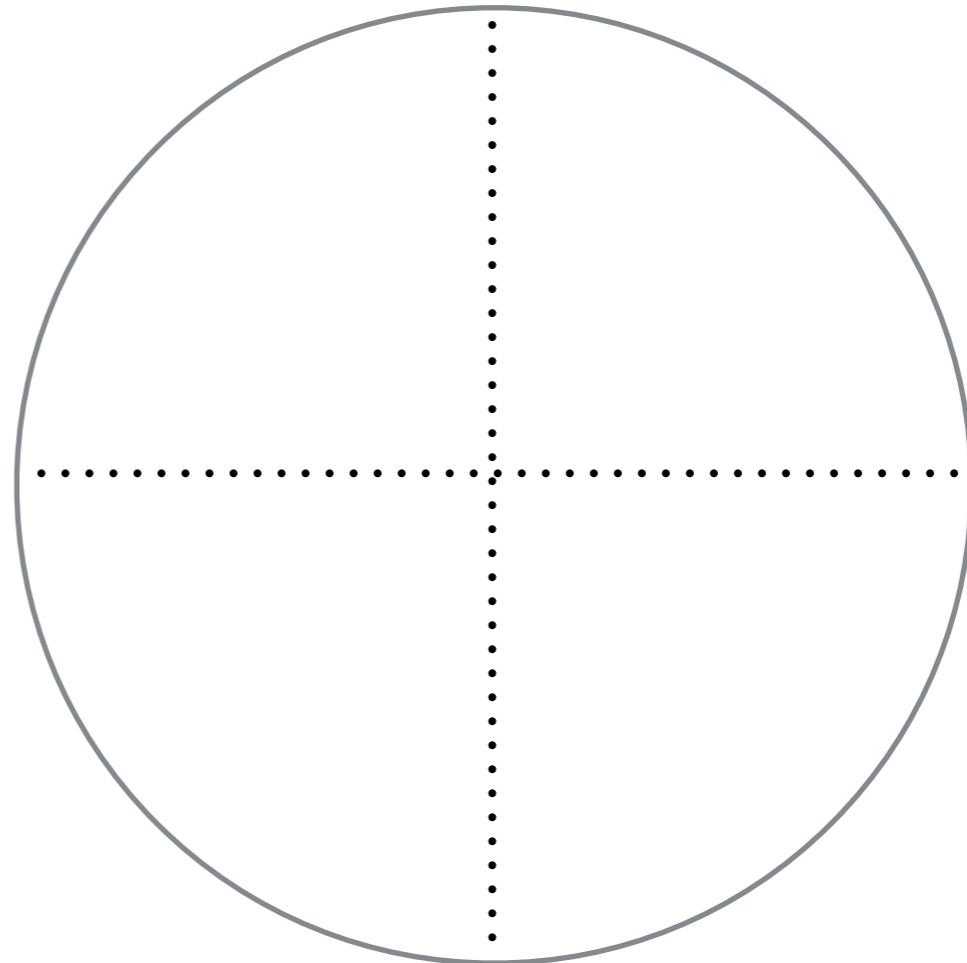
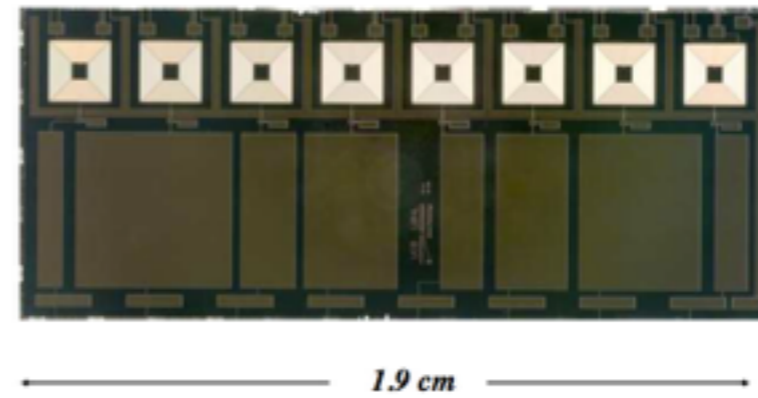
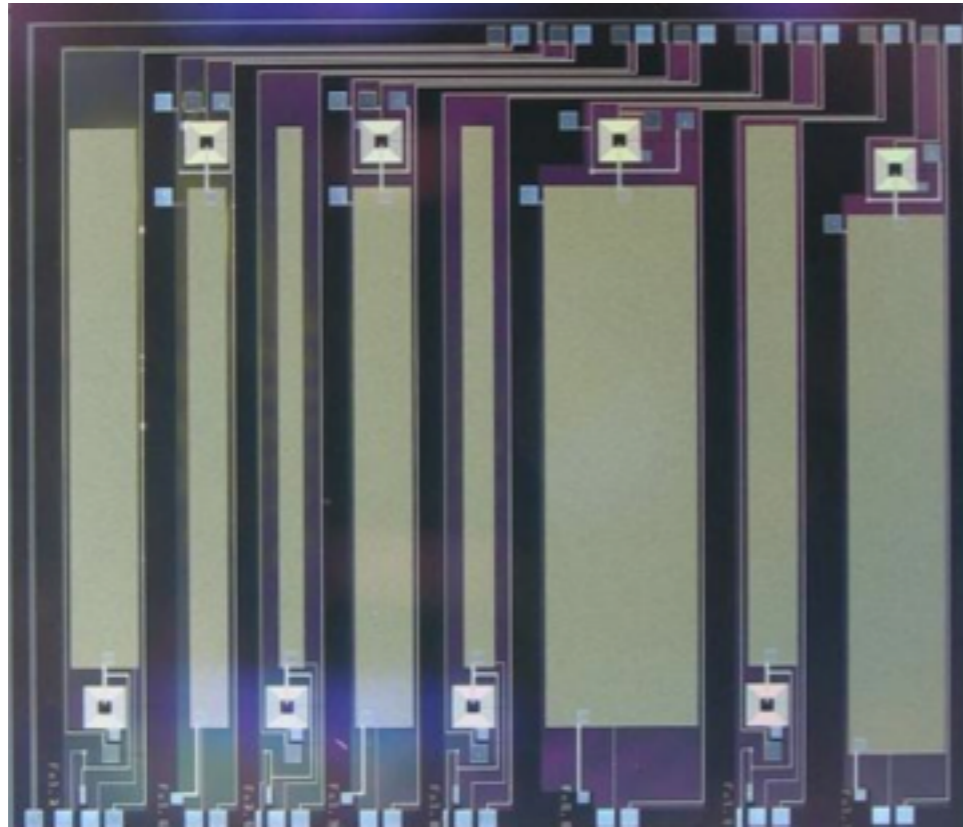
- $L \sim 20 \div 40 \mu\text{H}$ che per $d \sim 0.5$ mm fa ~ 200 giri

- Nb coil line width is 2 μm , and the pitch is 5 μm

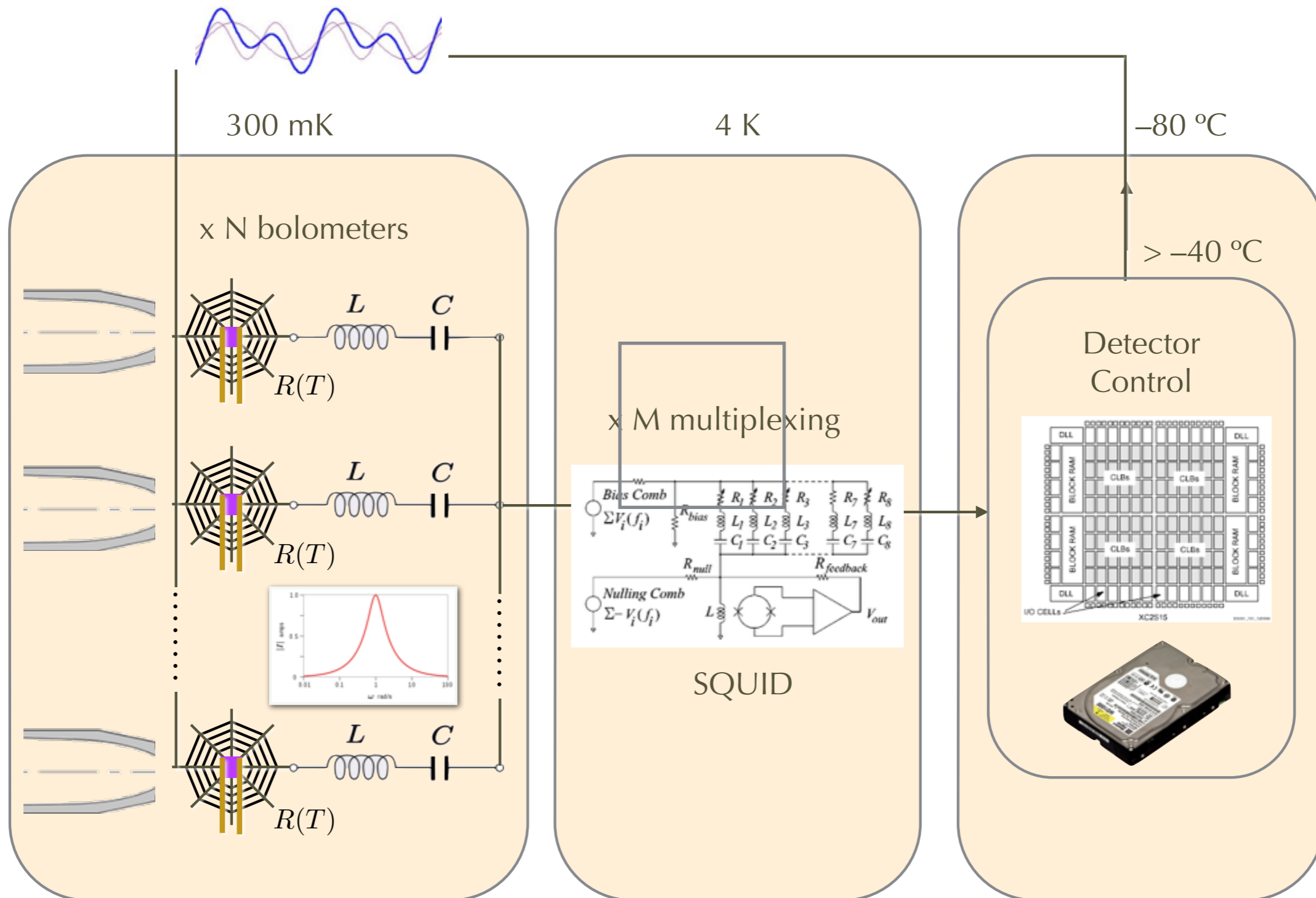
- LiF, Nb₂O₅, SiO



Risuonatori

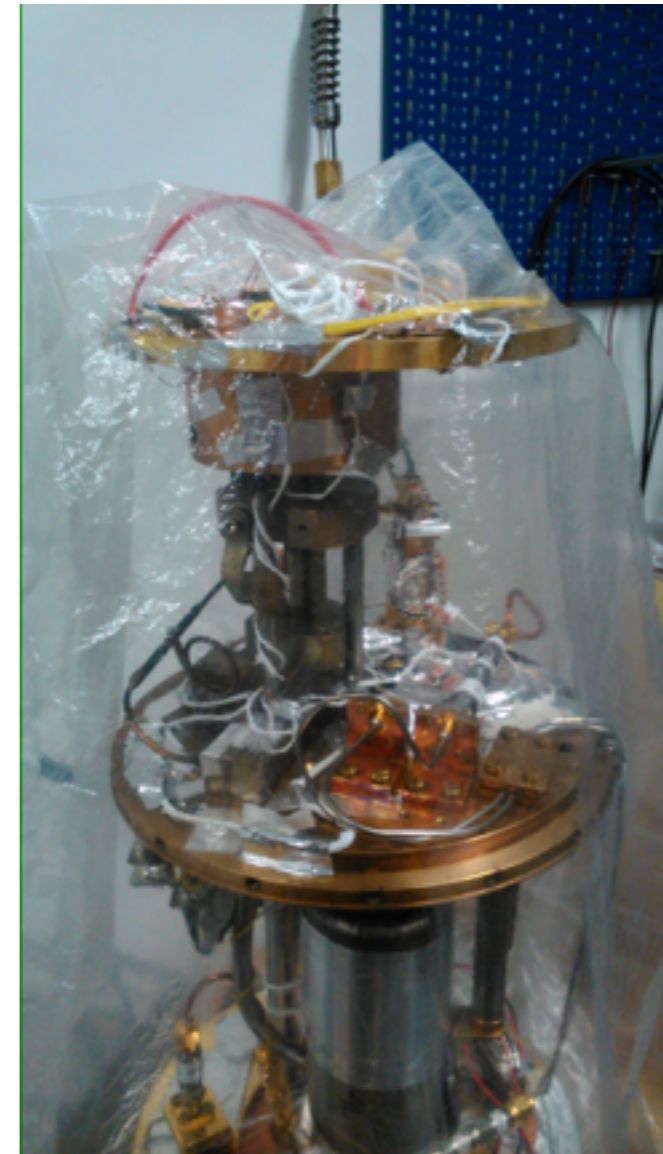


FDM



Criostato

- Esistente
- He-3 stage: 240mm tall 140mm diameter



Testbed preparation

- 4K pulse tube with remote valve
- adapt existing cryostat
 - si riesce (forse) a modificare un tappo
 - penseremo in futuro a espandere verso i 350 mK
- Gara terminata
 - SRP-082B Remote \Rightarrow 0.9 W a 4K
 - Chiller (richiesta in corso sul MEPA)
- To be ready at the beginning of 2015

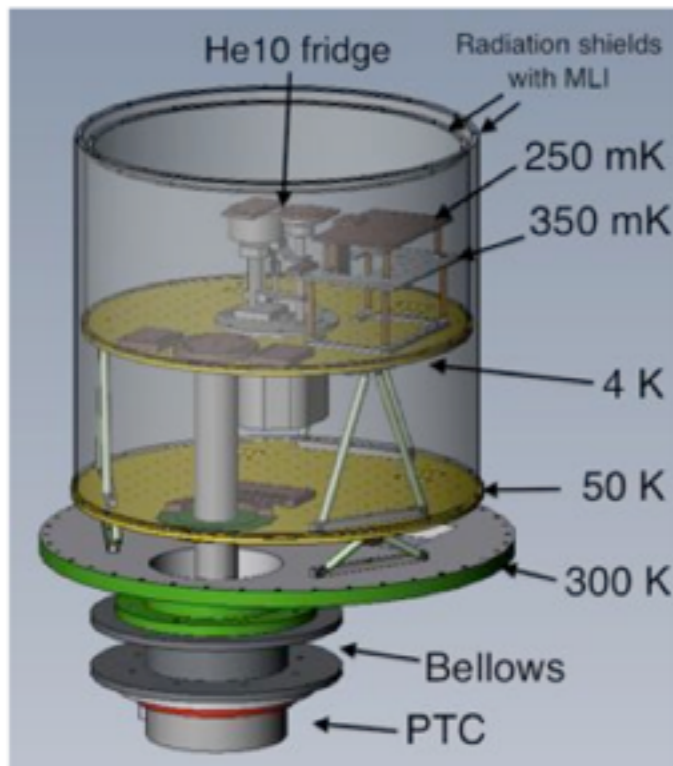


Figure 1. Solidworks model of cryostat, with outer shell hidden.

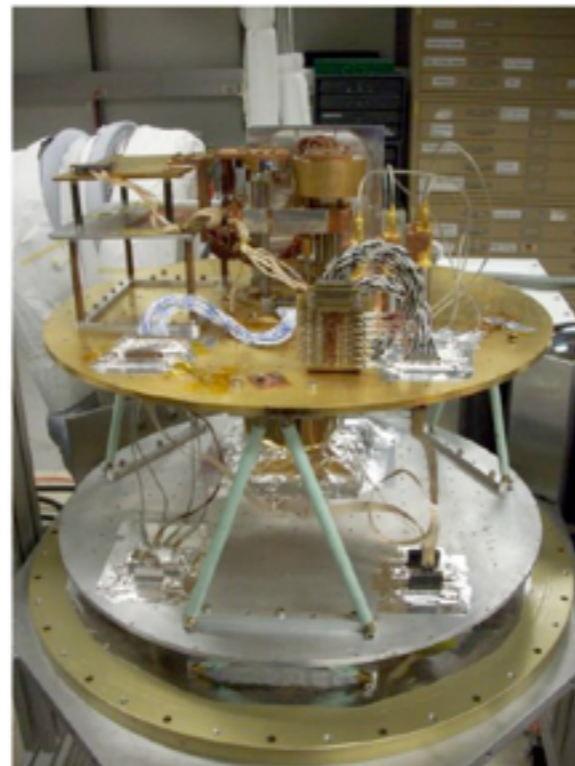
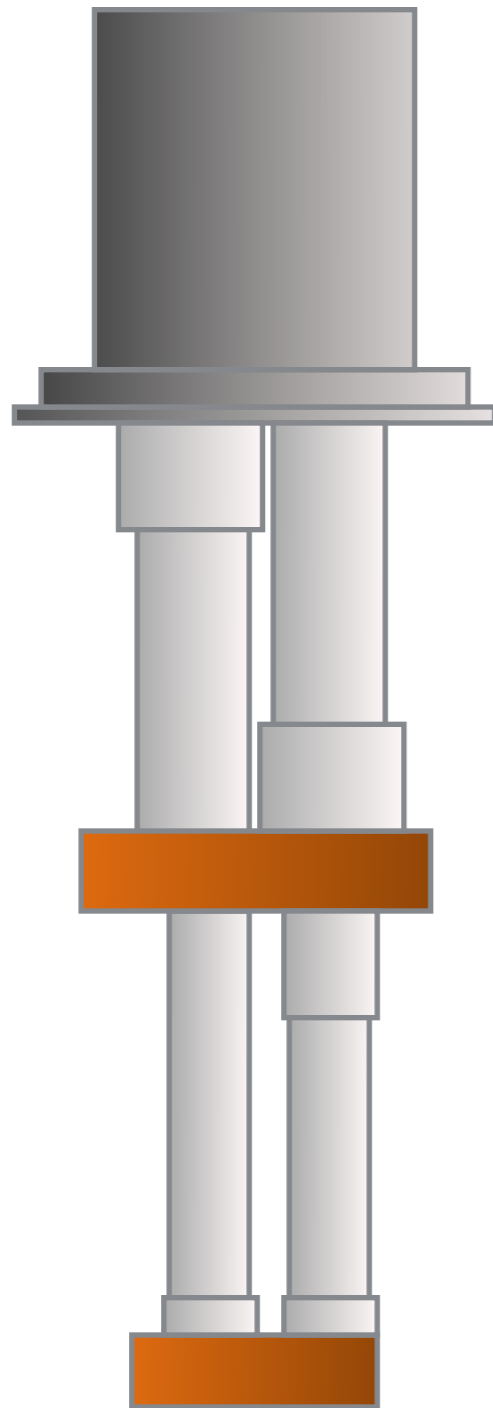


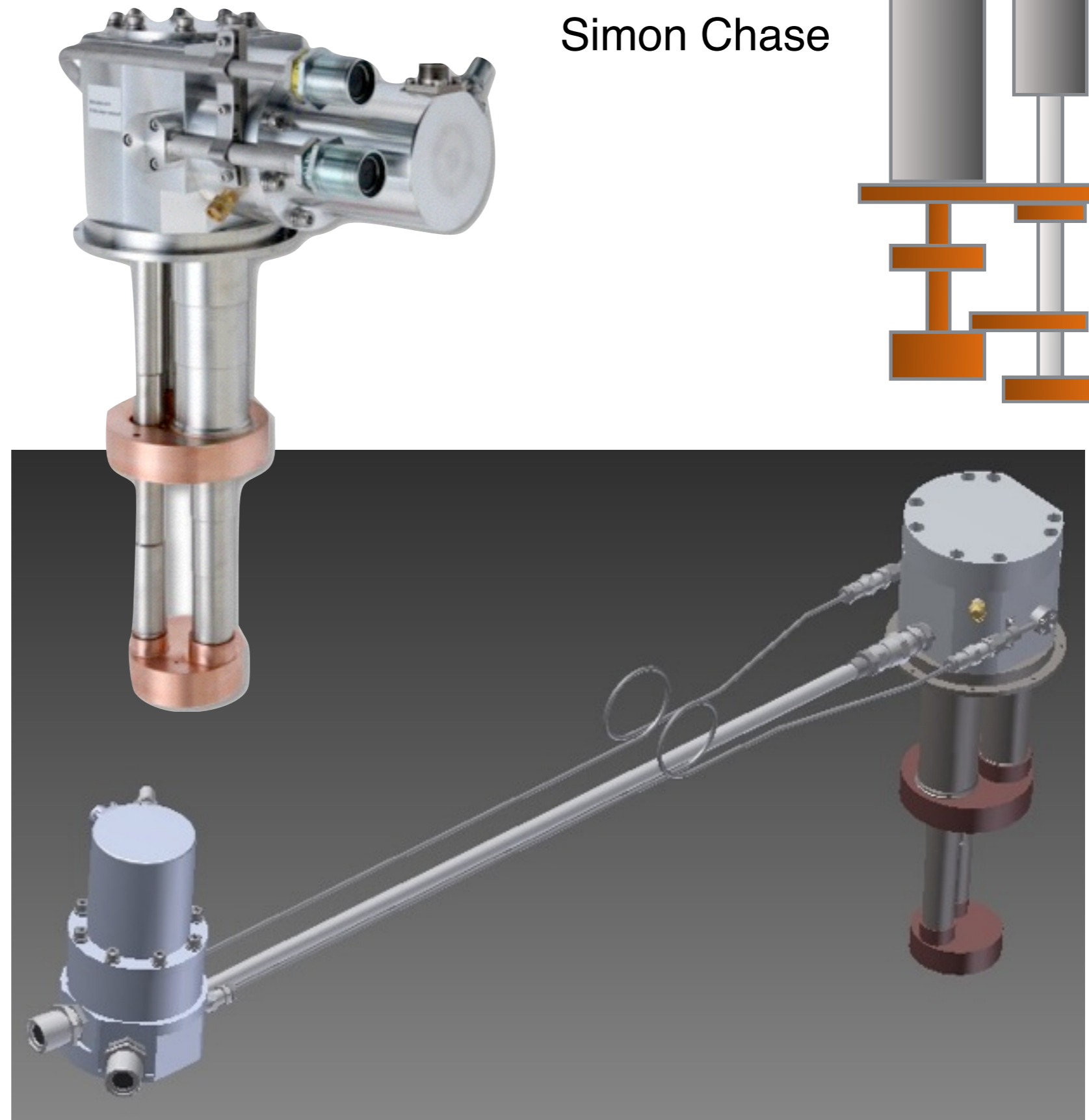
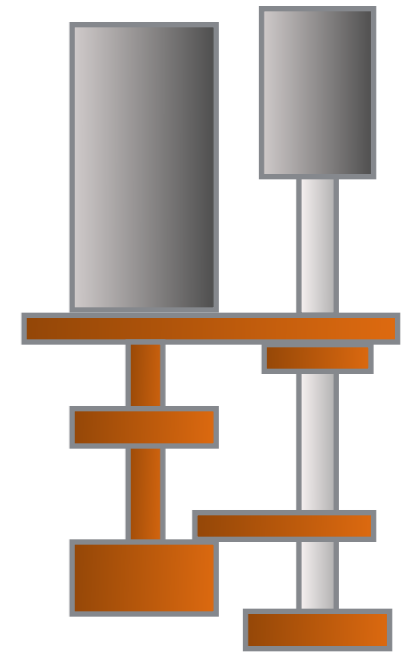
Figure 2. Photograph of interior of cryostat, rotated 180 degrees from Solidworks view



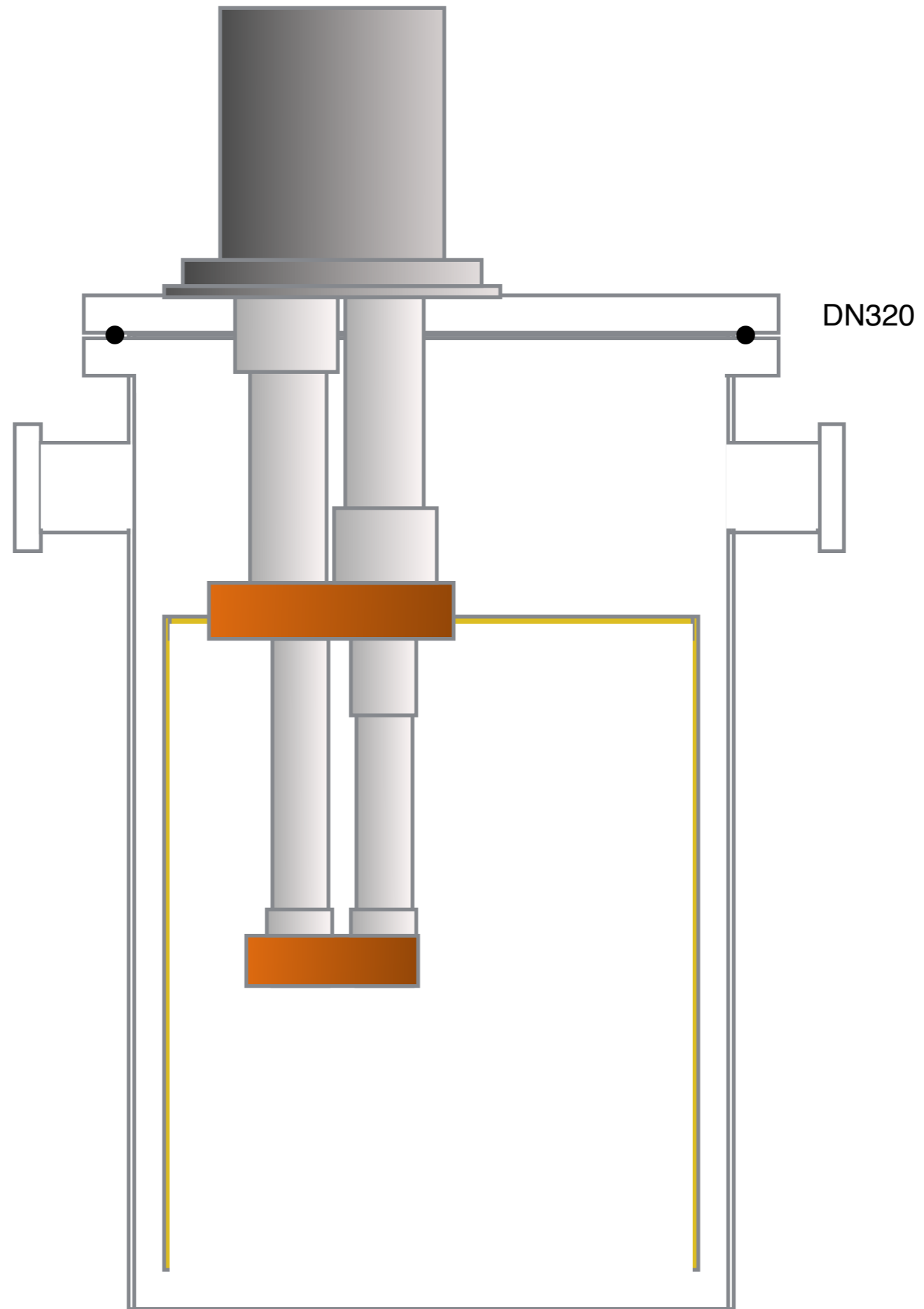
Testa fredda



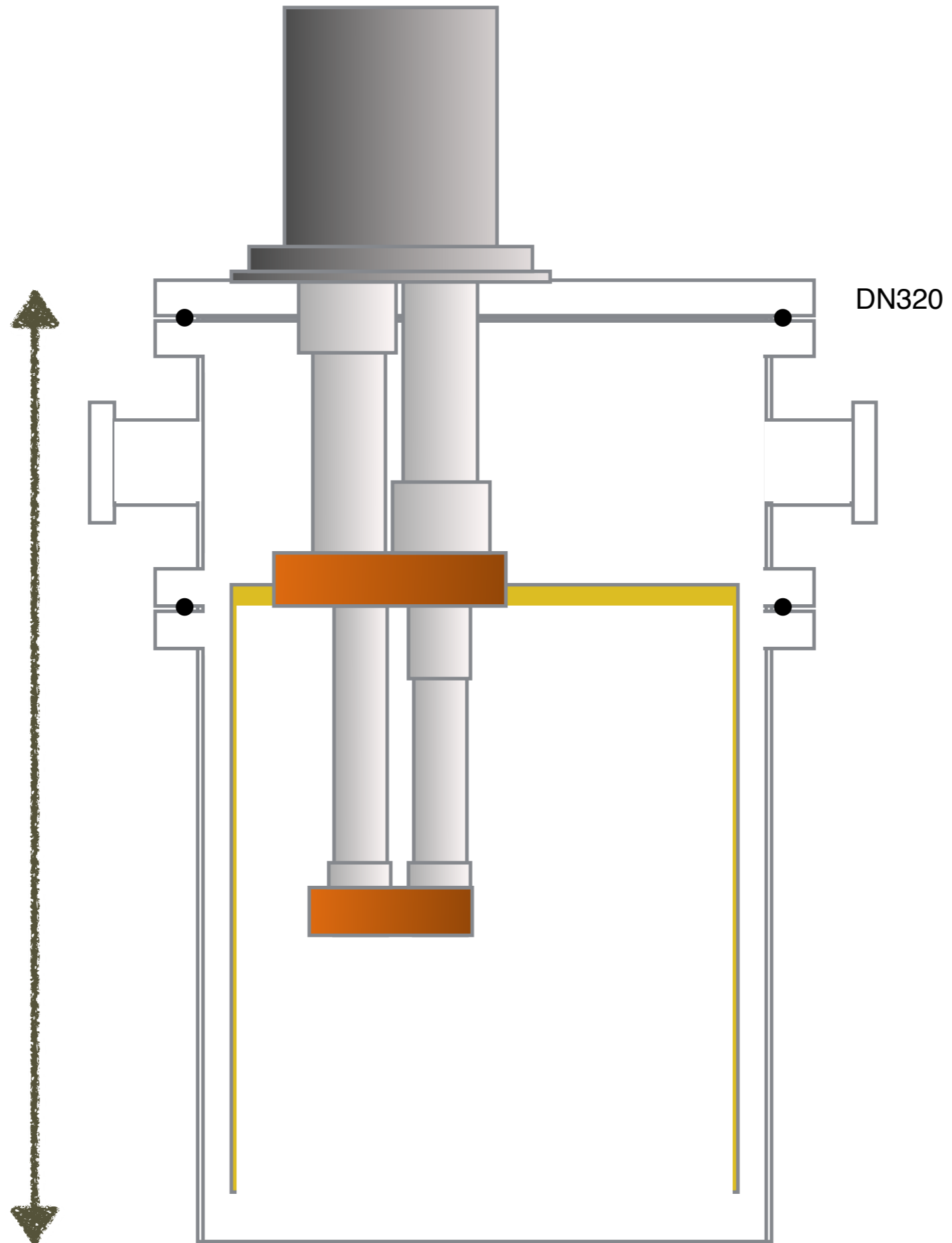
Simon Chase

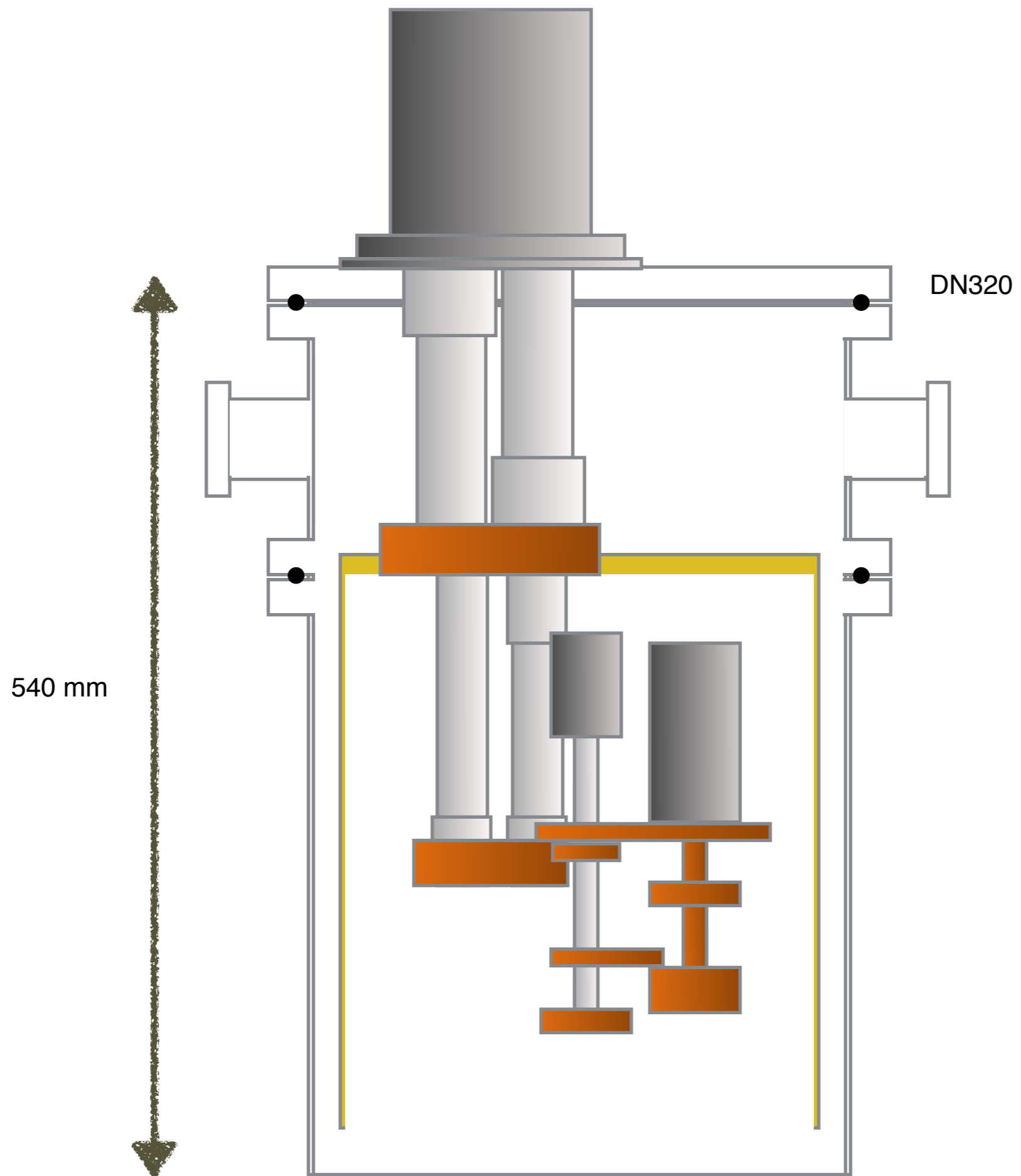


540 mm

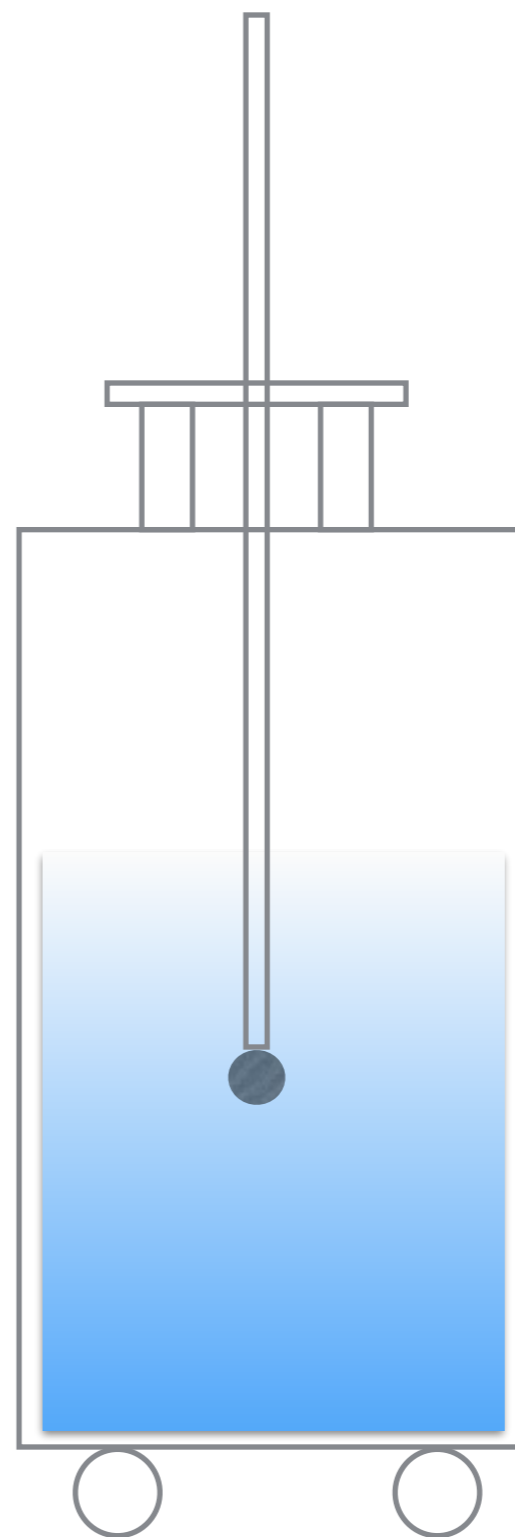


540 mm



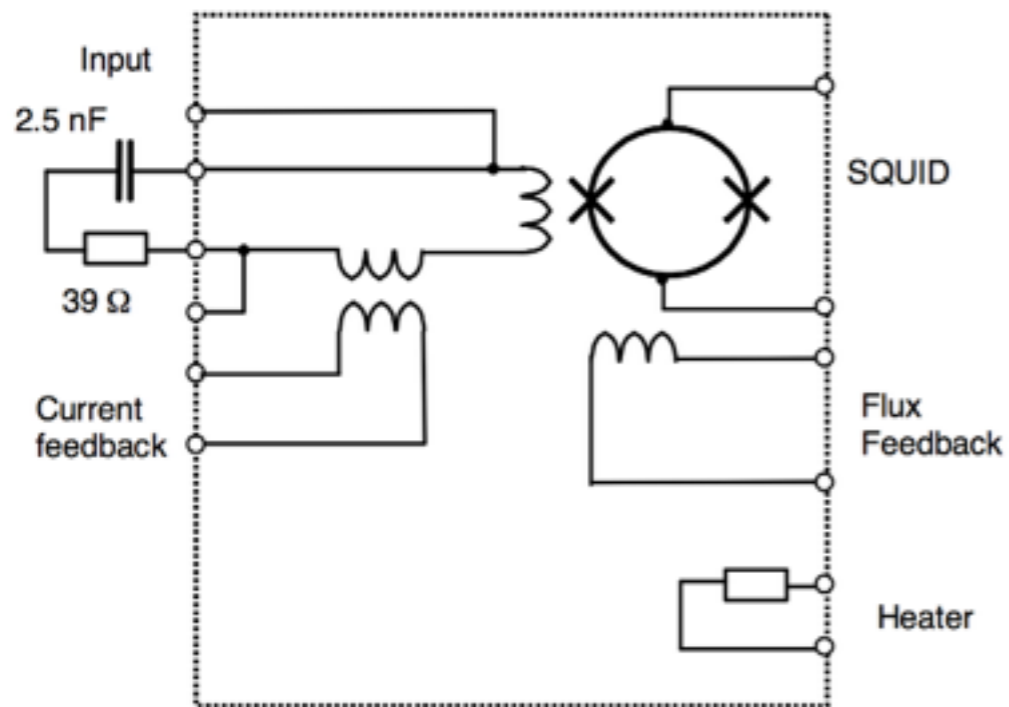


Test con LHe Dewar



Squids

- SUPRACON



Meccanica di supporto

