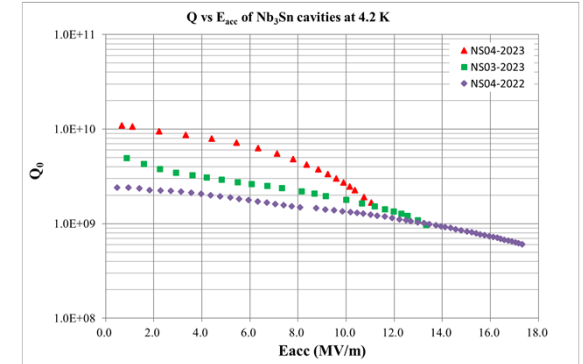
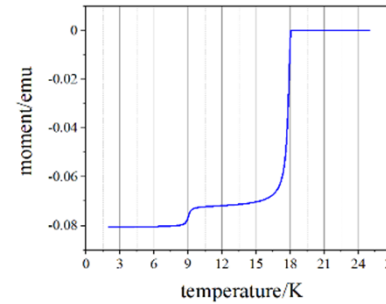
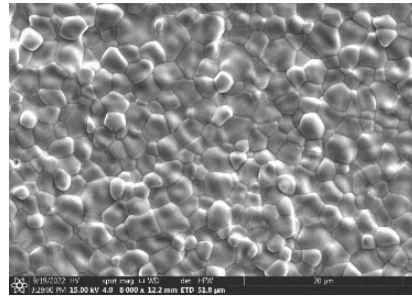
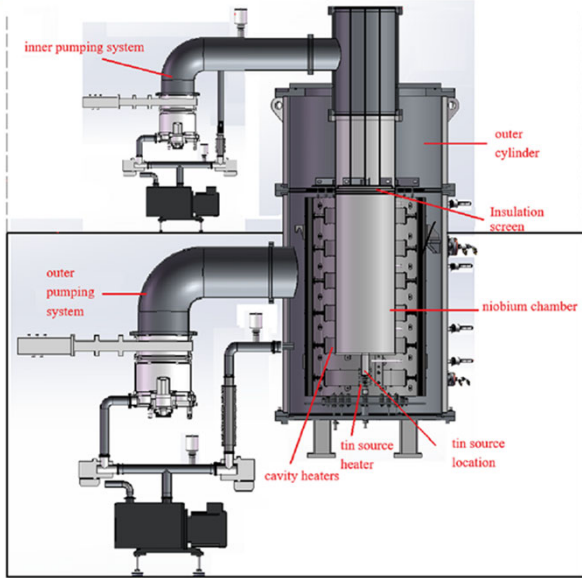
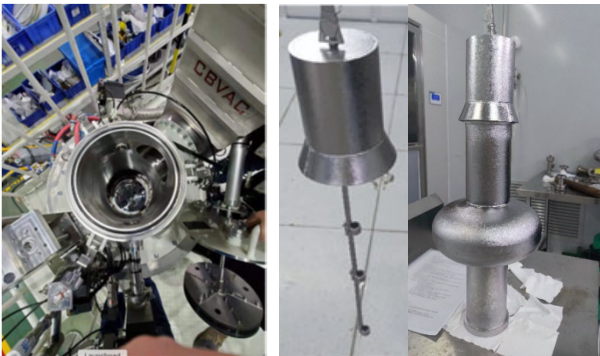




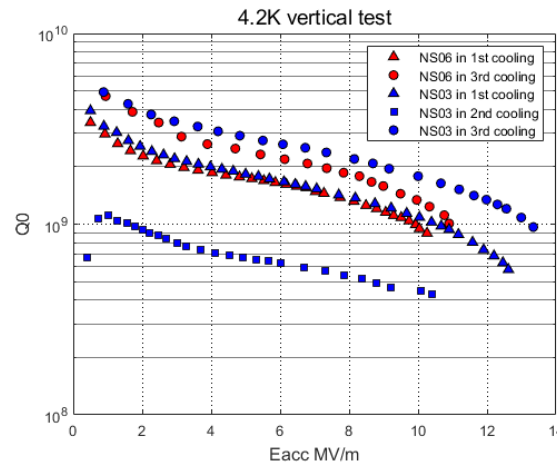
# Nb<sub>3</sub>Sn Cavities Coated by Tin Vapor Diffusion (Jiankui Hao, PKU)



Coating: 1250°C, 120 min, Annealing: 1150 °C, 60 min  
 $Q_0 \sim 1.1 \times 10^{10}$  @4.2K @ low field, max.  $E_{acc} \sim 17.3$  MV/m



3 tin sources

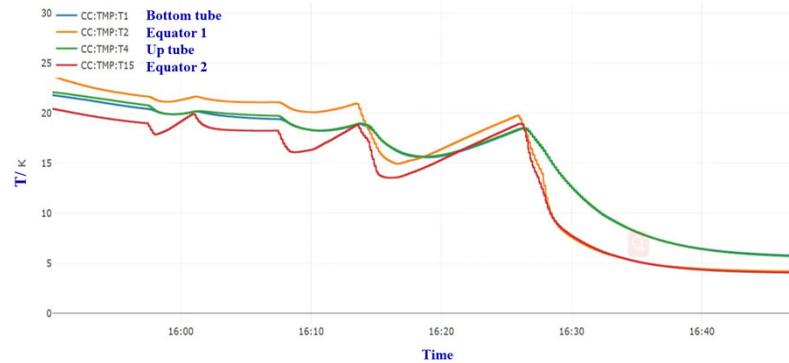
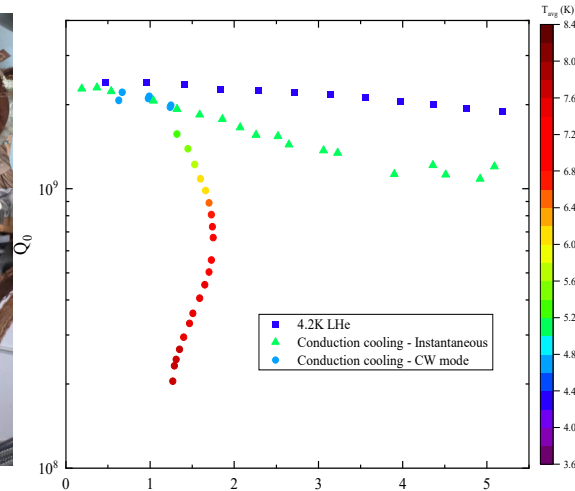
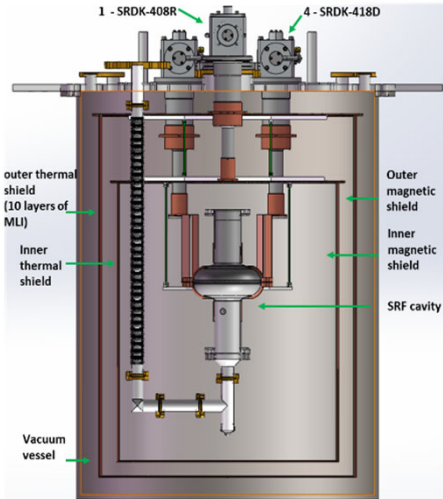


Vertical tests at different cooling rate

Vertical Tests (2023)	T grad., cooling rate	$Q_0$ @ ~1.0 MV/m
NS03(1 <sup>st</sup> , Oct. 17)	15.7 K/m, ~6 min/K	3.3E9
NS06(1 <sup>st</sup> , Oct. 17)	15.7 K/m	3.0E9
NS03(2 <sup>nd</sup> , Oct. 18)	110	1.1E9
NS03(3 <sup>rd</sup> , Oct. 23)	2.7 K/m, ~10 min/K	4.9E9
NS06(3 <sup>rd</sup> , Oct. 23)	2.7	4.7E9



# Conduction cooling of Nb<sub>3</sub>Sn cavity



Cryocooler on and off, 17-18 K,  $\Delta T < 2$  K  
 $T < 16$  K, cryocooler on, cooling down to 4 K

Nb<sub>3</sub>Sn cavity  
 Conduction cooling

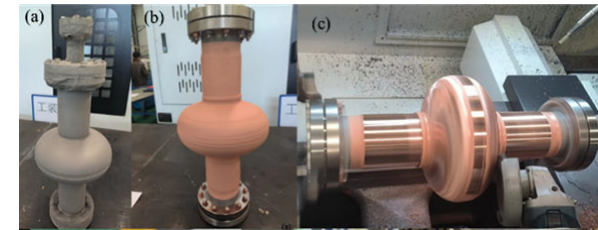
$$Q_0 \sim 7E8$$

$$@ E_{acc} = 1.75 \text{ MV/m}$$

$$P_c = 0.57 \text{ W}$$

## Next step

- Choose the best Nb<sub>3</sub>Sn cavity NS04
- Cold spray with copper
- Slower cooling controlled with heater



(a) sandblasted (b) cold sprayed  
 (c) mechanical polished

## Question/Discussion

- What's the best cooling rate for vertical test and conduction cooling?