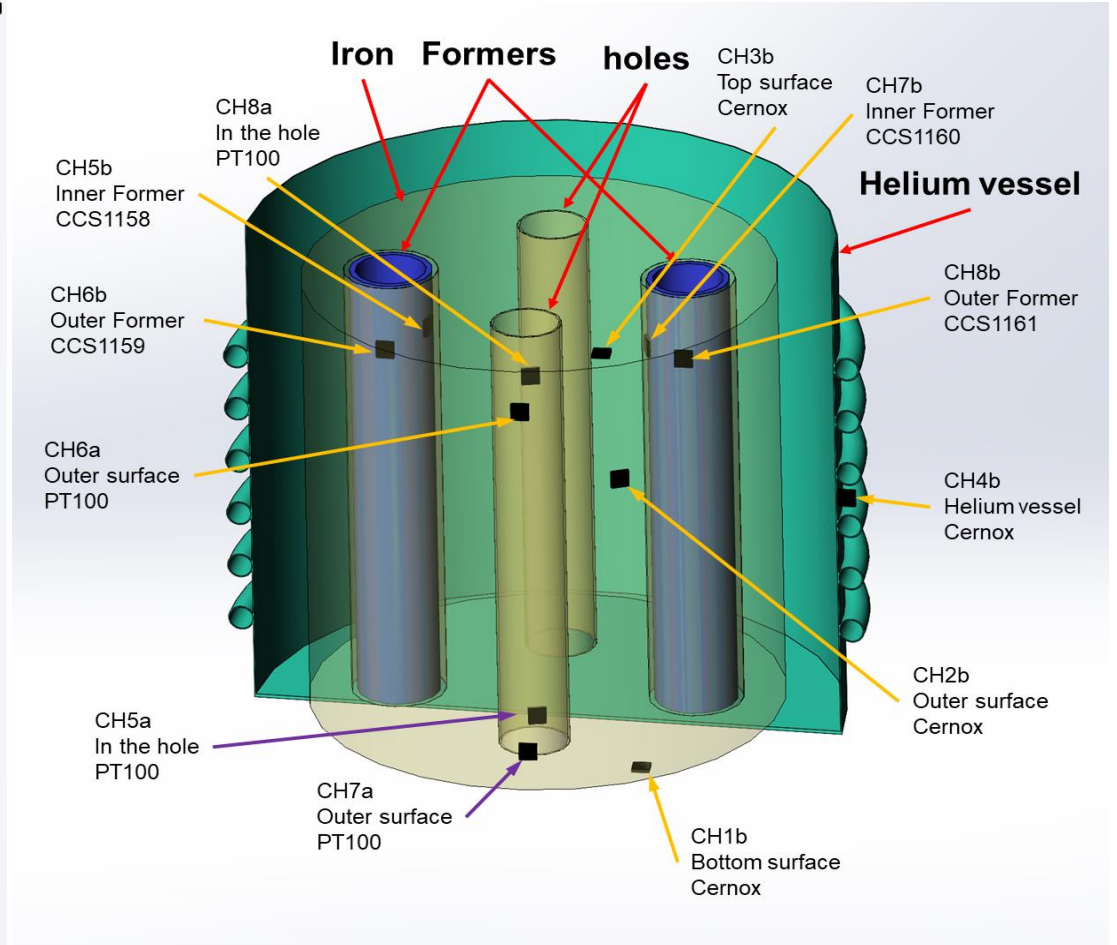
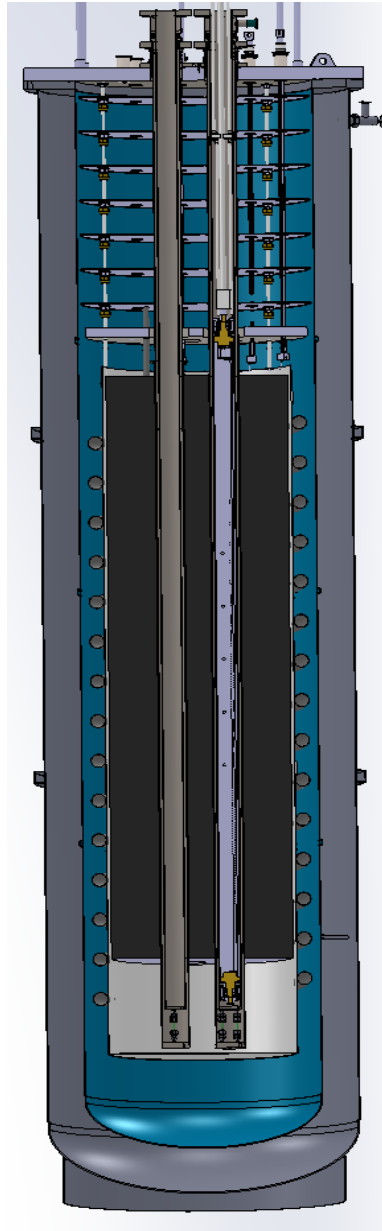


First Cooling down and test of the MCBRDP2 at IMP

IMPCAS Magnet Team,
Lanzhou, China
2020.06.30

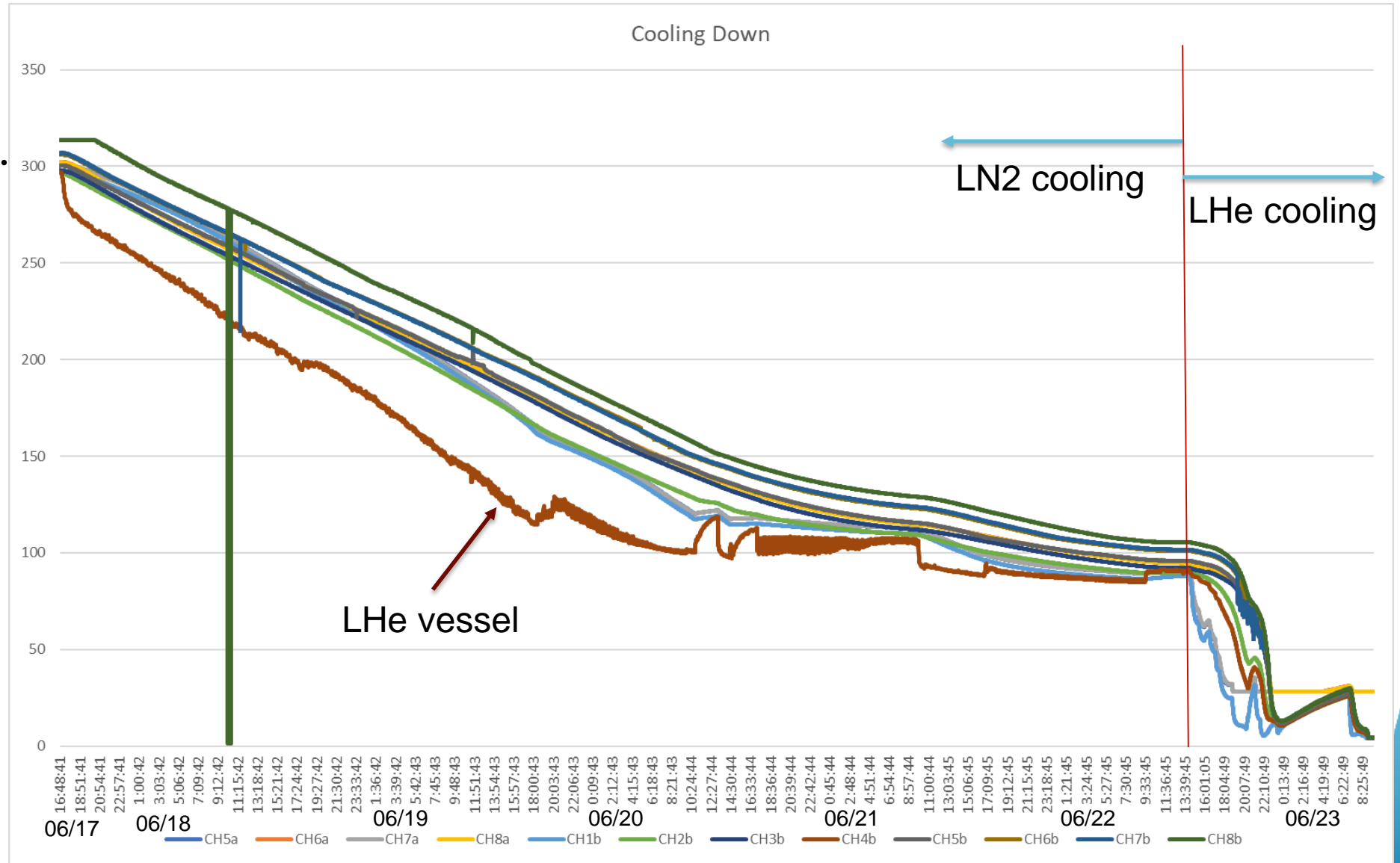
The indirect cooling method

- A Helium vessel with nitrogen pipe around the magnet as the cooling source.
- The LN2 filling from the up side of the nitrogen pipe.
- The dewar is filling with GHe.
- Heat transfer through GHe and the radiation.
- No LN2 touch the magnet.

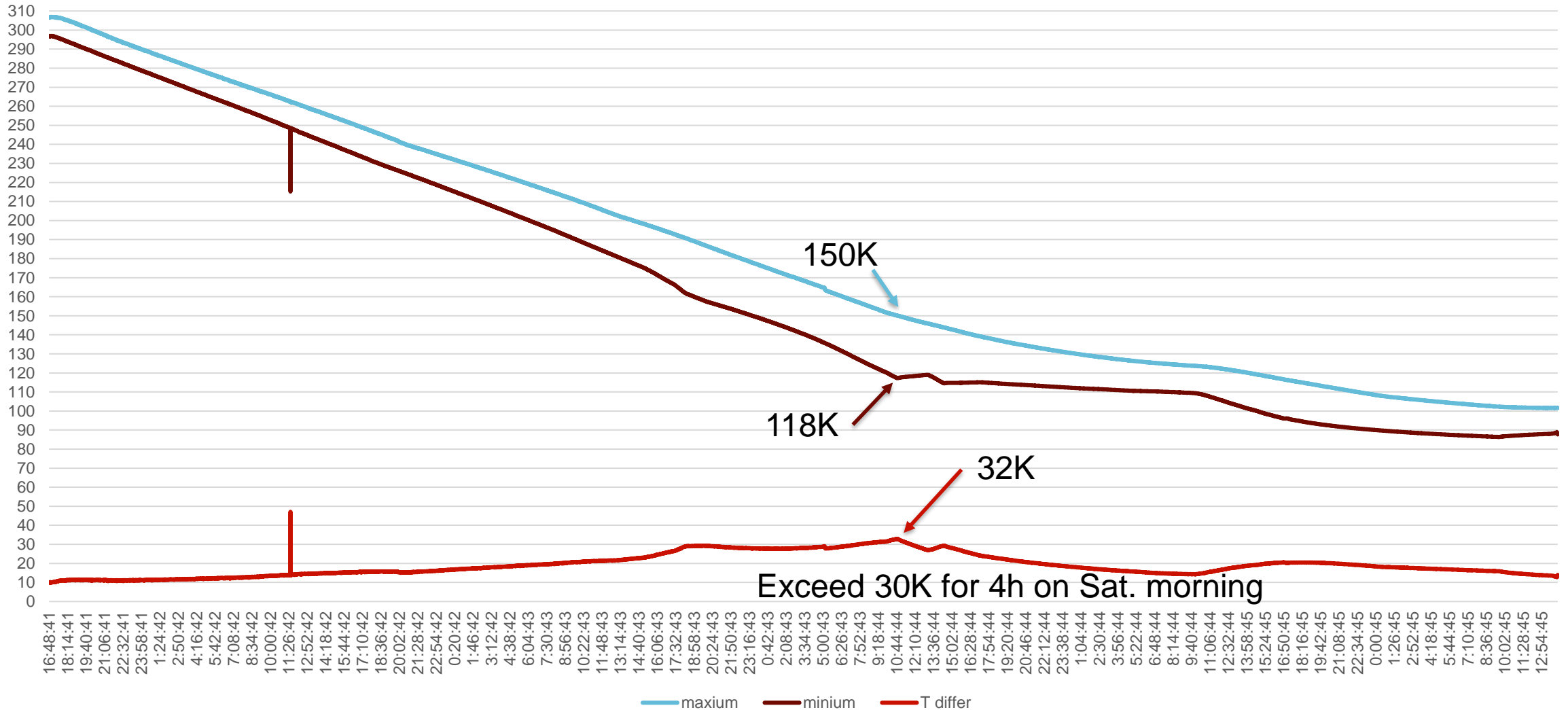


Cooling down curve

- LN2 cooling for less than 5 days.
- LHe cooling for about 19h, include 7h pause.
- 812L LHe for cooling down.
- 200L for filling.
- Totally 2688L for first test.

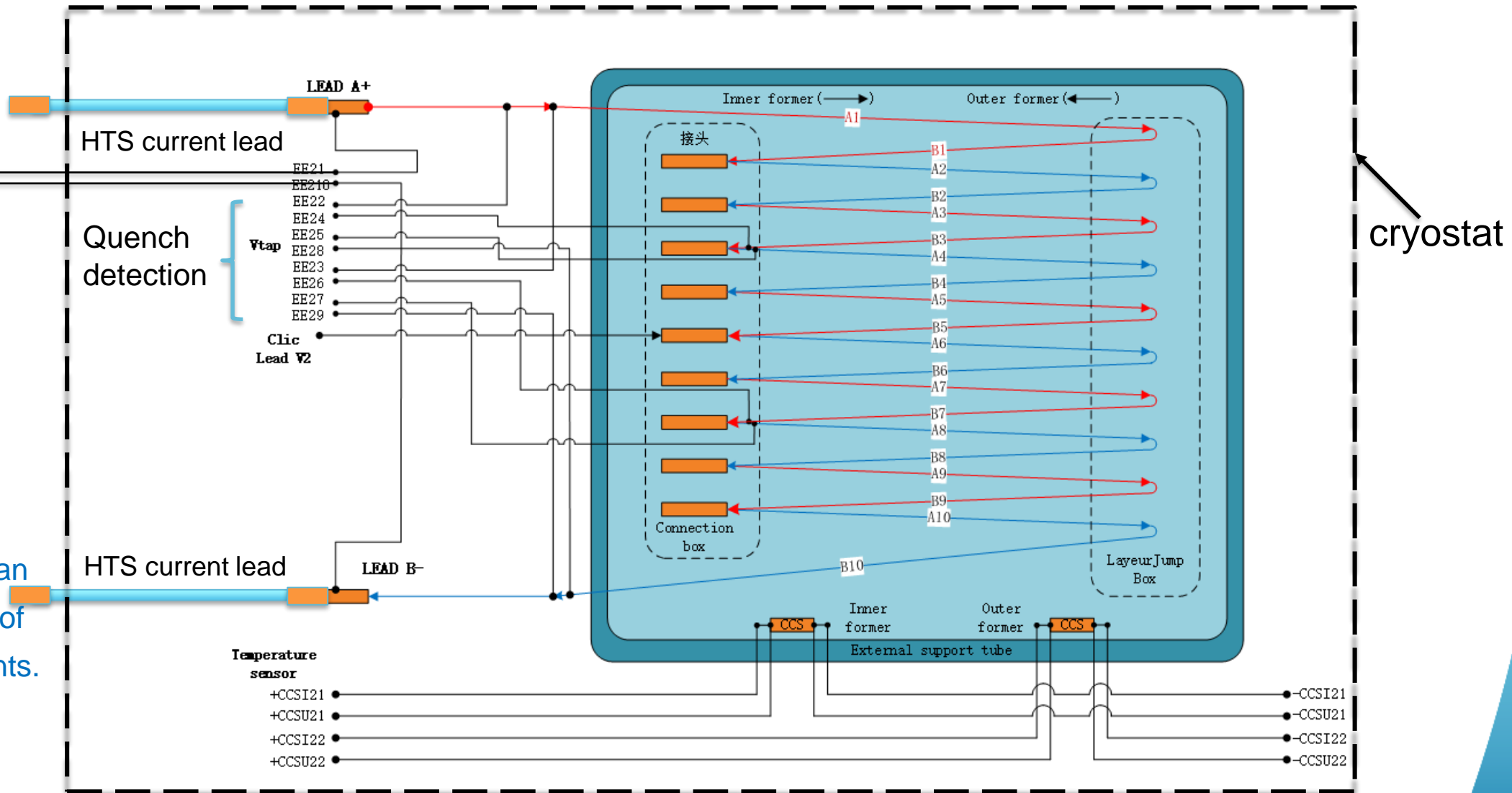


Temperature difference during LN2 pre-cooling

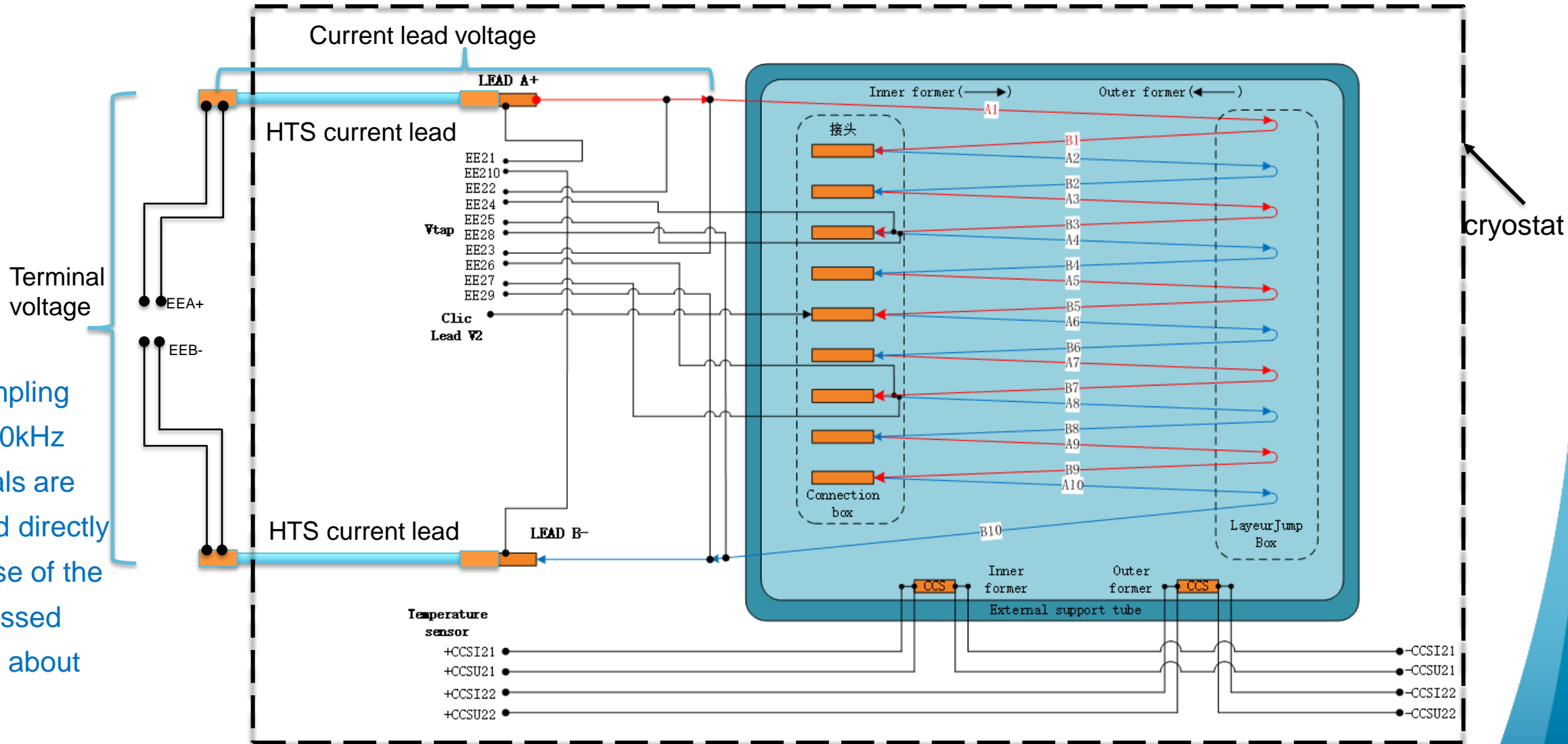


The circuit for the first cold test

- For DATAQ, the precision is not enough for low voltage.
- For quench detection, the sampling rate is 10kHz, then take an absolute average of every 10 data points. And the absolute value is recorded



The adjustment for the cold test – Now



Terminal voltage

Current lead voltage

HTS current lead

EE21
EE210
EE22
EE24
EE25
EE28
EE23
EE26
EE27
EE29

Vtap
Clic
Lead V2

HTS current lead

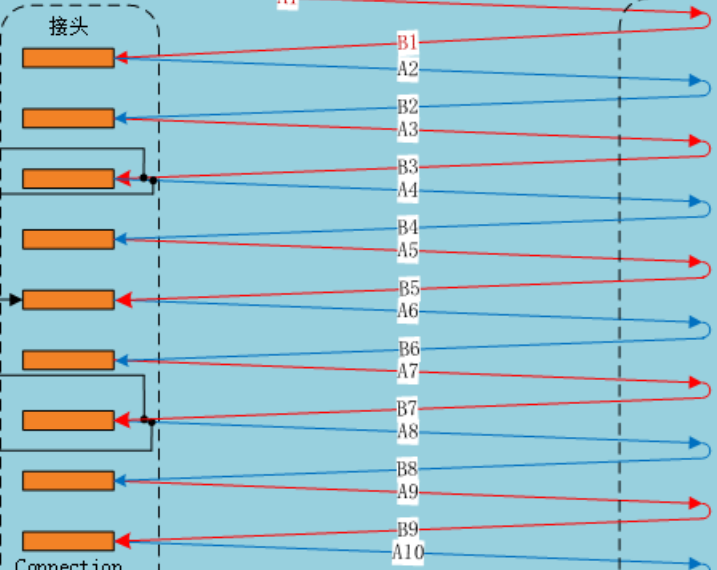
LEAD B-

Temperature sensor

+CCSI21
+CCSU21
+CCSI22
+CCSU22

Inner former (→)

Outer former (←)



cryostat

- The sampling rate is 10kHz
- All signals are recorded directly
- The noise of the unprocessed signal is about 20mV

Quench behavior

Run	Date	Time	File Name	Target current	Powering mode	Quench number	Current ramp rate	Ramp profile		Iq	QI	Notes
				A	#	#	A/s	___A to ___A	A	kA ² .s		
run1	23/6/2020	11:51	Trigger-1-10A	10	AP2		2	0	10	10	0.018	Manual trigger
run2	23/6/2020	14:45	Trigger-2-50A	50	AP2		2	0	50	50	0.4	Manual trigger
run3	23/6/2020	15:01	Trigger-3-100A	100	AP2		1	0	100	100	1.53	Manual trigger
run4	23/6/2020	15:15	Quench-1-155A	200	AP2	1	1	0	200	155	2.9	Quench
run5	23/6/2020	16:10	Trigger-4-200A	200	AP2		1	0	200	200	4.3	Manual trigger
run6	23/6/2020	16:25	Quench-2-209A	300	AP2	2	1	0	300	209	4.43	Quench
run7	23/6/2020	16:57	Trigger-5-300A	300	AP2		1	0	300	300	6.97	Manual trigger
run8	23/6/2020	17:19	Quench-3-304A	350	AP2	3	1	0	350	304	7.07	Quench
run9	23/6/2020	17:50	Quench-4-320A	350	AP2	4	1	0	350	320	7.36	Quench
run10	23/6/2020	20:07	Quench-5-322A	350	AP2	5	1	0	350	322	7.6	Quench
change to another power supply												
run11	23/6/2020	20:48	Quench-6-322A	350	AP2	6	1	0	350	322	7.73	Quench
run12	23/6/2020	21:11	Quench-7-328A	350	AP2	7	1	0	350	328	7.92	Quench
run13	23/6/2020	21:46	Quench-8-303A	320	AP2	8	2	0	320	303	7	Quench
run14	23/6/2020	22:00	Quench-9-299A	300	AP2	9	1	200	300	299	6.79	Quench
run15	23/6/2020	22:15	Quench-10-276A	300	AP2	10	1	200	300	276	6.51	Quench
run16	23/6/2020	23:10	Quench-11-240A	300	AP2	11	1	0	250	240	5.18	Quench
run17	24/6/2020	17:36	Trigger-5-10A	10	AP2		1	0	10	10		Manual trigger
run18	24/6/2020	17:44	Quench-12-227.5A	300	AP2	12	1	200	300	227.5		Quench
run19	24/6/2020	17:58	Quench-13-349A	350	AP2	13	0.2	300	350	349	9.38	Quench
run20	24/6/2020	18:24	Quench-14-350A	435	AP2	14	0.2	300	350	350	9.42	Quench
run21	24/6/2020	19:16	Quench-15-351A	435	AP2	15	0.2	200	400	351	9.43	Quench
run22	24/6/2020	19:36	Quench-16-349A	435	AP2	16	0.2	300	400	349	9.32	Quench

The second LHe cooling and test plan

- Start from 0:00 last night, reached high liquid level at 11:04.
- 816L for cooling down and filling.
- 800L left for powering test.
- To be powered again after the meeting today