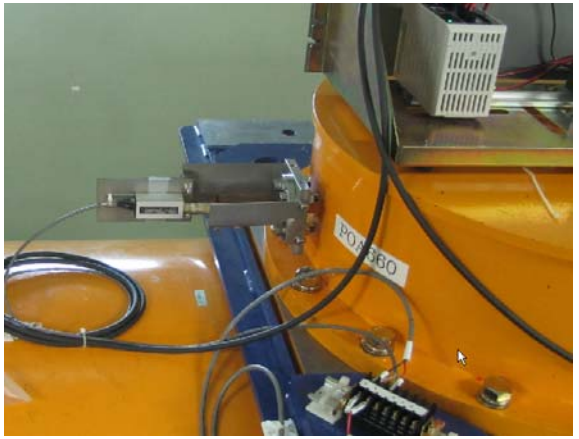
S1-G Modules assembly status : Cryostat (20100601)

(Norihito Ohuchi)

S1-G Module assembly status

- May 26
  - Helium leak test of helium and nitrogen lines were completed.
    - Helium and nitrogen lines were pressurized with helium gas.
    - Cryostat was in a vacuum condition.
    - Helium leak was not detected under the base condition of 3×10^{-10}Pa·m^3/s.
- June 1
  - Cabling thermal sensors, pressure gauges, strain gauges and laser position monitors was completed.
    - Thermal sensors: 107 (Module-A), 109 (Module-C), 29 (2K Cold Box)
    - Pressure gauge: 7 (2K Cold Box and Pump system)
    - Strain gauge: 24 (Module-A), 24 (Module-C)
    - Laser position monitor and axial position monitor: 5 (Module-A)
    - WPM: 13 (Module-A), 5 (Module-C)
    - Pin diode: 24 (Module-A), 24 (Module-C)
    - Mass flow meter:2 (Pump line, 5K shield line)
    - Heater: 2 (2K Cold Box)

Laser position monitor



axial position monitor

Feedthrough on Module-A

Remaining works

- Logging software.
  - Assigning signals in the measurement software.
- Pumping the vacuum vessels on June 3.
- Cool down will start in June 7 on schedule.

Estimated static heat load at 2K level (W)

	Module-A	Module-C
Cavity jacket (through wires of T sensors)	0.18	0.18
Cavity jacket (through wires of WPM)	0.90	0
Cavity jacket (through wires of Pin diode)	0.82	0.82
Tuner shaft	0.48	0
RF cables	1.24	0.02
Piezo cable etc.	0.84	0.03
Four input couplers	0.17	0.25
GRP (through signal wires)	0.21	0.21
GRP (through WPM wires)	0.56	0.56
GRP (through support posts)	0.20	0.20
Summation	5.60	2.27

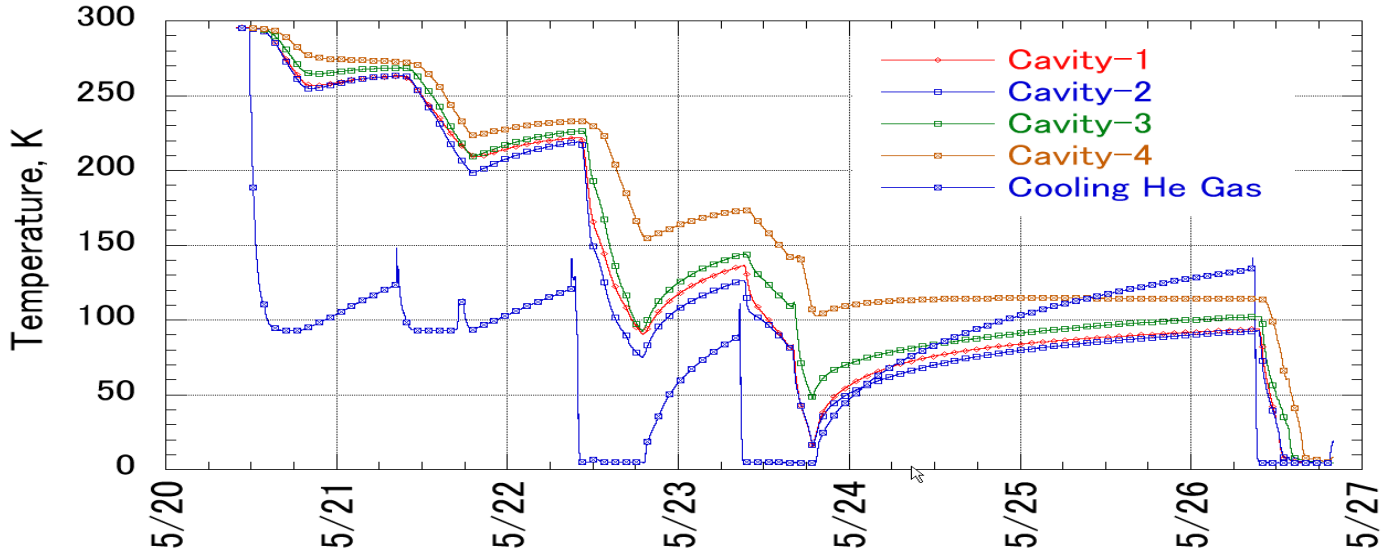
Heat load evaporating LHe in Cryomodule : 4.84W 1.51W

Heat load in 2K cold box and connection tube= 2.39 W

4.84 + 1.51 + 2.39 = 8.74 W

Maximum acceptable heat load of pumping system = 30 W

Cool down of 4 cavity STF module in 2008



1. The first step of cool-down of the Module-A with four cavities
   - In the first two days, four cavities and the GRP were cooled to 200 K by helium gas at 90 K.
   - The total mass flow rate was 1.0 g/s, and the typical cooling speed of the cavities was 7.3 K/h.
2. Cool-down from 200 K to 4K
   - Liquid helium at 4 K was directly transferred from the liquid helium Dewar of 2000 L on the ground level to the cryomodule in the tunnel.
   - For cooling the four cavities down to 4 K, liquid helium of 1630 L was consumed.
   - In the cooling process, the cooling speed of cavities was 12.5 K/h.
   - The total time for cooling four cavities from room temperature to 4K was 49 hours.

S1-G cryomodule: cold mass is double of 4 cavity STF module. ⇒ Cool down time = 100 hours (10 days)

Cool down and thermal test schedule

Mon	Tue	Wed	Thu	Fri	Sat	Sun
June 7	Cool-down by 90K helium gas Cooling 80K shields with LN2 until 22:00				Cooling 80K shields down to LN2 temp.	Non-cooling cryomodule
June 14 Cool-down by LHe		Heat load meas. at 4K	Repeatability			
1. Supplying LHe to 2K dewer in the 2K Cold Box. 2.Heat loss measurement at the 2K CB . 3. After the measurement, continuing cooling Modules with LHe.	1. Cooling Modules with LHe to 4K.	1. Heat lord meas. of S1-G modules at 4K. 1-A.Heat lord meas. @ 4K steady condition. 1-B. HL meas. @ 4K with heater (Calibration) Heater power: •half of HL of S1G module •HL of S1G module	1. Heat lord meas. of S1-G modules at 4K. 1-A.Heat lord meas. @ 4K steady condition. 1-B. HL meas. @ 4K with heater (Calibration) Heater power: •half of HL of S1G module •HL of S1G module	Pumping to 2K	Cooling 80K shields down to LN2 temp.	Non-cooling cryomodule
Cooling 80K shields with LN2 until 22:00						