

35h Summary of Meeting for S1-Global Module Design, Cryomodule and Cryogenics (20100420)

Date: 2010/04/20

Time: 21:30-22:30 (Japan Time)

Attendant: Jim Kerby, Tug Arkan, Tom Peterson, Serena Barbanotti, Carlo Pagani, Eiji Kako, Toshihiro Matsumoto, Hirotaka Nakai, Hitoshi Hayano, Tetsuo Shidara, Nobu Toge, Akira Yamamoto, Kaoru Yokoya, Norihito Ohuchi

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Agenda

1. Cavity test plan (Eiji Kako)
2. Cryomodule thermal measurement plan (Norihito Ohuchi)
3. Study plan for HL/LL-RF and DRFS (Toshihiro Matsumoto)

Discussion

(0) Module-A assembly status (Norihito Ohuchi)

- The 80K thermal radiation shield of Module-A was assembled onto the cold mass today.
- Assembly work of Module-A is on schedule.

(1) Cavity test plan (Eiji Kako)

- The 1st cool-down of the cryomodule begins at June 7.
 - June 21 to June 25: Low-power RF test (1)
 - Tuner stroke & hysteresis, variable input Q_L , monitor Q_t , HOM Q_{ext} , Piezo stroke & hysteresis, and Piezo reproducibility
 - June 29 to July 2nd: Low-power RF test (2)
 - Input Q_L , Q_t calibration, Piezo single pulse response, mechanical vibration mode
 - July 5 to July 8: low-power RF test (3)
 - Piezo double-pulse response, Piezo multi-pulse response
 - July 20 to July 23: Low-power RF test (spare time)
 - July 24: Warm-up
- Summer shut down of cryogenics
 - August 23 to Sept. 4: Aging 8 couplers
 - It requires three days for aging one coupler.
 - Participation from DESY, SLAC and FNAL is absolutely necessary.
- The 2nd cool-down of the cryomodule is scheduled at September 6.
 - Sept. 21 to Oct. 1: High-power RF test
 - Input Q_L , Q_t calibration, Cavity processing (0.6ms, 1.5ms), observation of L.D.
 - Oct. 4 to Oct. 15: Lorentz detuning
 - Offset optimization of D., RF FB on/off control, compensation of L.D., Optimization of L.D. compensation
 - Oct. 18 to Oct. 29: Dynamic heat loss measurement of each cavity
 - Nov. 1 to Nov. 5: Dynamic heat loss measurement of four-cavity-operation
 - Nov. 8 to Nov. 12: Dynamic heat loss measurement of eight-cavity-operation

C (Jim): The tuner work in July and the participation of FNAL are being discussed in the FNAL group. For the coupler processing, we will have a conversation with Chris in SLAC who is the right person. For the thermal test, Tom and Serena express interest. Akira and Bob will talk about the participation of FNAL to S1-G cryomodule test on Thursday.

Q: When will the cool-down of CM1 start?

C (Akira): Double check of the cool-down period of CM1 is important for discussing the participation of FNAL group to S1-G cryomodule test.

C: CM1 cool-down should be actually in summer, and CM2 has a cavity work. Two things are going together at once.

(2) Cryomodule thermal measurement plan (Norihito Ohuchi)

- 1st test term
 - June 16 to 17: Static heat loss measurement at 4K
 - July 12 to 16: Static heat loss measurement at 2K
 - Overall heat loss measurement at 2.5K and 2K, heat loss measurement at GRP,

Cryomodule heat loss measurement, calibration measurement by heater

• 2nd test term

Sept. 15 to 16: Static heat loss measurement at 4K

Oct. 18 to 29: Dynamic heat loss measurement of each cavity

Heat loss meas. at three or four gradients and the detuned condition for one cavity

Nov. 1 to 12: Dynamic heat loss measurement of four – cavity – operation and eight – cavity – operation

Heat loss meas. at the maximum gradient

Nov. 22 to 26: Static heat loss measurement at 2K

Overall heat loss measurement at 2.5K and 2K, heat loss measurement at GRP,

Cryomodule heat loss measurement, calibration measurement by heater

C: The temperature of heat loss at 2.5K could be 2.25 to 2.3K because this measurement should be performed to recognize the difference between super-fluidity and normal-fluidity of LHe.

C: The cool-down and warm-up line is very slowly warmed up after finishing cool-down to cavities. The helium in the line is slowly evaporated, and the vapor is slowly pushed to cavities. This could be additional heat load to the cryomodule. For this issue, we need some study in the static heat load measurement.

C: It is difficult to estimate the time to wait for the complete steady thermal condition.

C: The time is dependent on the heat load, and it can be decided by measuring the temperature distribution of the pipe to reach the equilibrium condition. This heat loss from the cool-down/warm-up pipe is important issue in the ILC cryogenic design, too, because the module-string has the long cool-down/warm-up pipes.

C: Thermal oscillation in the line happens, and it should be checked in the heat load measurement. These issues should be studied in the first test term.

C: We expect Tom and Serena join the thermal measurement, and the second term is better for participation.

C: Tom will be available in October.

C: Carlo, Angelo and Rocco will join the low-power test of cavities for two or three weeks. The date will be confirmed between Eiji and Carlo to confirm the flight in a couple of weeks.

(3) Study plan for HL/LL-RF and DRFS (Toshihiro Matsumoto)

• 2nd test term

Nov. 15 to 19: Operation of 8 cavities under FB control

Fast interlock system using loaded-Q monitor

Vector sum FB control of 8 cavities under Piezo compensation

Vector sum FB control with IF-Mix scheme

Feedback instability

Nov. 29 to Dec. 22: DRFS system evaluation

Fast interlock performance

Field regulation

Sag compensation

Cavity filling procedure

Forward and reflection monitor without circulators

Klystron output characteristics under reflection

Next meeting date

Meeting Date: 11 May 2010 22:00 (Japan time), 8:00 (FNAL), 15:00 (INFN and DESY)