

# DRAFT: Minutes of ML-SCRF Technology Meeting (101020)

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## **Date & Time:**

Special Time / Location: 8:30-14:02 GMT, October 20, 2010, at IWLC2010 and via Webex.

## **Participants:**

H. Hayano, N. Ohuchi, C. Nantista, A. Yamamoto, D. Reschke, K. Tsuchiya, H. Nakai, R. Pararella, R. Geng, T. Peterson, Y. Pischalnikov, S. Fukuda, C. Pagani, R. Rimmer, E. Elsen, V. Parma, S. Michizono, T. Himel, K. Yokoya, R. Kephart, C. Ginsburg, J. Carwardine, W. Bialowons, H. Weise, P. Garbincius, P. Lebrun, J. Kerby, M. Ross, N. Walker, T. Shidara, (and several other participants)

Presentation files are available at the following Indico site:

<http://ilcagenda.linearcollider.org/conferenceOtherViews.py?confId=4507&view=standard&showDate=20-October-2010&showSession=77&detailLevel=contribution>

This was a special meeting of the ML-SCRF group, held in conjunction with the IWLC 2010 in Geneva and encompassing the S1-Global and Industrialization reports.

## **1) S1 Global Reports**

There were a set of reports (12:00-14:04, Wednesday October 20) on the very good progress of the S1-Global tests. First, with respect to cavities, performances of 7 out of the 8 cavities were reported by Eiji Kako with the last test being anticipated by the end of this week. Results have ranged from a large increase (due to the difference between a pulsed horizontal test and a CW vertical test) to decreases, particularly in TB9ACC011 and Z108, where the exact cause for the drop is unknown (however, though the cause may vary, such drops statistically are not unusual in cryomodule tests of the last few years). The average gradient in S1 Global so far is several % below the VTS average, with four of the seven cavities to date showing essentially no change, with two being limited at lower gradients, and on far exceeding its performance in a previous test. The test program has been compacted somewhat due to the previously reported failure of the IGBT switch, but this has been fixed and the schedule adjusted to help. Recent visits by Denis Kostin (DESY) and Yuriy Pischalnikov and Warren Schappert (FNAL) are greatly appreciated.

Next, a detailed report of the thermal performance of the cryomodule was given by Norihito Ohuchi. The extensive thermal readouts installed on S1-Global cryomodule have produced a set of data on the temperatures of cavities, shields, couplers, and intermediate locations on each during operation that may be more complete than any previous set. These results can be used to confirm the heat leak, and the thermal models of each item. Potentially the most unusual values at first glance were the temperatures on the coupler intercept, which suggested the straps used to attach the intercept locations to the heat sinks were undersized. More complete modeling will be completed.

The alignment measurements were reported next by Kiyosumi Tsuchiya. S1-Global has both the stretched wire system on the helium gas return pipe for the four Cryomodule-A cavities, and a laser displacement system for measuring the helium gas return pipe (HGRP) position during cool-down process. Unfortunately during the first cool-down the stretched wire was broken. The laser data were shown, and indicated a large displacement of the ends of the HGRP (~3.7mm) during cool-down, and a warm-cold-warm repeatability of 0.1mm. The cold shift ranges from 0.25 to 0.4mm. The effect due to the shrinkage of the HGRP itself is being checked.

S1-Global presents a grand opportunity for the comparison of tuner designs (4 tuners installed with two cavities each) and Carlo Pagani reported the results. For 6 of the 8 tuning systems installed, the static tuning was confirmed in terms of range, hysteresis and capability to drive the cavity to operating frequency. For one of the blade tuners, after correctly performing a first tuning cycle about 1.3GHz, an unknown failure happened during the 2<sup>nd</sup> cycle and the frequency is now fixed at 1299.92MHz. This investigation will have to occur next year. For one of the slide jack tuners, it initially moved towards higher frequencies, but then a failure occurred in the drive shaft joint and the frequency stuck at 1299.95MHz. It was possible to replace this drive shaft as access is possible in this tuning system design. Many detailed static and dynamic tests have been done in both the slow and fast (Piezo) systems, and with the exception of the failures the systems have performed by and large as expected. [The Piezo system results are described in an IWLC talk by Yuriy Pischalnikov on October 21, 2010].

Finally, the DRFS system test preparations were described by Shigeki Fukuda. Due to the problems with the IGBT switch in the current system, the schedule has been delayed and the DRFS schedule compressed from 3 weeks at the end of the year to 1.5 weeks. Almost all the hardware is in house, and is assembled. The LLRF system is also coming together. As this is the first opportunity to technically prove the design, the team is

eagerly looking forward to it.

## **2) Industrialization Discussion**

The earlier morning session was a follow on to the IPAC Industrialization Workshop.

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4530>

From that workshop, a plan has been developed to request information from vendors for cavity procurements in the quantities required for the ILC, but assuming that the production contract is split at least among two companies to mitigate risk to the ILC project. The work will build off the specification discussions earlier in the day. CERN experts (Vittorio Parma) described the LHC Cryostat experience, and all the plan changes required to accommodate various upsets during production, from high bids to vendor insolvencies to unplanned for storage needs. In all cases CERNs ability to step in as an integrator, taking responsibility directly for production where required but supervising the efforts of subcontractors in others. Also, in a side discussion the point to not over specify the requirements to keep the pool of vendors as wide open as possible saved LHC large amounts of money; for instance, not specifying equipment as 'cryogenic' unless it was absolutely required.

The current XFEL experience with contracts was run through by Hans Weise, as an iteration of the LINAC10 conference paper. Due to multiple non-technical issues, the contracts for the XFEL cavities have gone through two iterations with the companies, but were signed in early July. The coupler contract has also been recently signed, and the cryomodule bid is to follow. By European law, the specifications are public 6 months after the contract award, so inspection of this information can occur in the new year.

The Americas region plan over the next 2 years includes 40 ARRA cavities recently ordered and plans to pay for an industrial time/motion study of the plant which will be required. In Asia, the progress of the pilot plant at KEK was described by Hitoshi Hayano, including the installation of fabrication tools. The full schedule will be driven by the EBW, which is expected to arrive in Spring, 2011.

## **3) Further Plans and Meetings**

Next ML-SCRF Webex meeting: 17 November, 2010, 14:00- GMT

First Drafts of Mid-Term (Interim) Report from Authors: 5 November, 2010

PAC Review (at Eugene, Oregon, USA): 11-12 November, 2010.