Project Managers' Report

JUNE 2010

ILC Global Design Effort

Project
Managers
Report

In June, 2010, we report progress with the ILC-GDE R&D activities in TDP-1 as follows:

Major events and progress in May, 2010:			
Technical Area	Event and/or Progress	held/hosted	Days
General	- Americas Regional Team Annual Review	Fermilab	June 9-10
SCRF	- Completion of S1-Global Cool-Down - TAGL webex meeting	KEK	June 15 June 2 June 30
CFS/GS	- CF Review at KEK "ASIAN SINGLE TUNNEL DESIGN STUDY OF THE ILC CF IN MOUNTAINOUS REGIONS" - TAGL webex meeting	KEK	June 1-2 June 9
AS	- TAGL webex meeting		June 18
PM-.AD&I	- Preparation for TDP R&D Plan Rel. 5, - AD&I webex meeting "10Hz low centre-of-mass operation - Planning and preparation for BAWs – meeting with PD BAW Coordinators		June 23 June 30

ILC-PAC:

The 4th ILC Project Advisory Committee was held at Institute de Fisica Corpuscular (IFIC), University of Valencia, Valencia, Spain, on 13/14 May 2010. The Committee reported in June: http://ilcdoc.linearcollider.org/record/28235/files/PAC_May-2010-report-final.pdf?version=1

DoE/ NSF Annual America's Regional Team (ART) Program Review

The Annual Review of the ILC 'America's Regional Team' was held at Fermilab 9/10 June, 2010. http://ilcagenda.linearcollider.org/conferenceOtherViews.py?view=standard&confId=4571. This year, the comprehensive review highlighted SRF R & D activities.

SCRF

Global cooperation for cavity/cryomodule assembly and test: S1-Global:

Preparation for the cavity/cryomodule test (S1-Global) has progressed on schedule. The assembly work of the eight-cavity string was completed by the end of May at KEK. This remarkable achievement is due to a strong collaborative effort between DESY, Fermilab and INFN, led by KEK. The S1-global was cooled in mid-June and low power testing has started.

CF Review

A CFS internal review on the design study of the Asian Single Tunnel CFS design suitable for mountainous regions was held at KEK on June 1-2 is in preparation. It is to be the first review of three regional studies including regional specific features and constraints.

The review agenda is available at:

http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4613

R&D Plan Release 5

The draft release 5 of the TD phase R&D plan is to be submitted to the Executive Committee for review during the ICHEP meeting in mid-July.

Baseline Assessment Workshops (BAWs)

The dates for the two BAWs have been set for September 7-10 at KEK and January 18-21 (2011) at SLAC. The first half of the first workshop (BAW-1 at KEK) will focus on the issue of average accelerating gradient, while the second half will deal with the single-tunnel configurations and in particular the HRLF solutions (KCS and DRFS). The workshop announcement was distributed to wider community including physics/detector groups on May 3. The announcement for the second BAW (BAW-2 at SLAC) will be made in July. BAW-2 will deal with the relocation of the positron source and reduced beam-power option.

AD&I Study on Higher-Luminosity with 10Hz Operation in Low Energy

Following on from the work at the Beijing workshop, a summary of the status of the 10Hz operation scenario for low-energy running has been produced and is available in ILC-EDMS (ID# D*907775). A focus AD&I meeting on 10Hz operation was widely announced, and was held on June 23rd. The meeting summary is posted on the meeting indico page:

http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4624 .

1.0 SCRF

(meeting minutes: http://ilcagenda.linearcollider.org/getFile.py/access?resId=1&materialId=minutes&confId=4671

The general activities in SCRF technical area in June is summarized in the minutes of SCRF monthly meeting as follows:

1.1 Cavity

Reports from Group Leaders and Excerpts from Group Meetings

- Cavity Gradient

Hitoshi Hayano reported on the successful test, to 35MV/m, of the first Hitachi 9 cell (without HOM coupler). Q0 at 35MV/m was 6E9. This is a very encouraging initial result. Cavity electron beam welding was done by a sub-contractor, 'MIRAPRO' Corporation. Also at KEK, the first IHEP Beijing 1.3GHz Large Grain Low Loss Type 9 cell cavity was vertically test and reached 20MV/m. The fabrication and all surface treatments were carried out at IHEP.

Camille Ginsburg (Fermilab, Database team leader), presented updated preliminary cavity 'production yield' results from the cavity database group that show signs of continued improvement. http://ilcagenda.linearcollider.org/getFile.py/access?contribId=2&resId=1&materialId=2&confId=4671 . The previous update was presented at LCWS10, in late March 2010. These data, hopefully to be included in Release 5 of the R D Plan, show 56% second pass yield for 35 MV/m.

At the ART Program Review, Mark Champion (Fermilab) showed the US cavity inventory totals of (38 present / 88 expected) (slide 34) and Fermilab vertical test facility throughput of 2 / week with a total nearing 100. (slide 25). http://ilcagenda.linearcollider.org/getFile.py/access?contribId=3&resId=0&materialId=slides&confId=4571 .

Sebastian Aderhold (DESY) reported that eight large grain cavities have been processed and are in queue for vertical testing

- Cavity Integration (Hitoshi Hayano)

Initial studies of the S1 Global cryomodule include: Stroke of motor tuner, Q_L adjustment of the variable coupler, adjustment to the nominal f_0= 1300.00 MHz and Q_L = 3.0 x 10e6, Stroke and hysteresis of piezo-tuner, Calibration of Q_t,(the monitor coupler), HOM filter

properties, Multi-cycle hysteresis of piezo-tuner, Single pulse response of piezo-tuner. Test result figures are posted: http://ilcagenda.linearcollider.org/getFile.py/access?contribId=0&resId=0&materialId=slides&confId=4674

Of special interest: the motor tuners for two of the eight S1G cavities, ACC011 and MHI09, became stuck after initially cycling successfully two tuners. This apparent failure is under study.

1.2 Cryogenics

- Cryogenics (Tom Peterson)

To help with the CFS consideration of the Asian Single Tunnel Design, the Cryogenics Technical Group have been asked to provide comments and advice concerning the installation and operation of high power compressor equipment in underground enclosures. In the Mountainous Region Single Tunnel Design under discussion, surface space for support equipment is not available. The question asked is: "*what is the technical feasibility of cryogenics equipment installation underground*"? Initial discussion of the question has been focused on heat removal from heavy rotating machinery.

1.3 Cryomodule

- Cryomodule (Norihito Ohuchi)

The cryomodule design group have assembled a list of objectives for Release 5 of the R D Plan. The list includes thermal shield, magnetic shield, microphonic vibration suppression and plug-compatibility issues.

1.4 HLRF

- HLRF (Shigeki Fukuda and Chris Nantista)

The HLRF team are preparing for DRFS testing with the S1 Global cryomodule in December 2010. Chris reported on the R&D status at SLAC: the large pipe section for the KCS tests is now being pumped down.

ML Integration

Akira has asked Chris Adolphsen to prepare a report on the quadrupole magnets in the cryomodules and related issues in communication with Jim Kerby and Vladimir Kashikhin. A visit to Saclay (EU-XFEL) to discuss general quadrupole design, test and installation issues has been planned for July.

2.0 CFS/Global Systems

Meeting indico page: http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4629

2.1 CFS

The highlight of the last month's activity was the review, hosted by KEK, of the Single Tunnel Design of the ILC in a mountainous region. In

preparation for the review the group met together via teleconference several times to explore the critical aspects of the mountain region design and develop a list of questions to be included in the review material. The technique proved to be quite valuable and the limited time of the review meeting itself could therefore be used efficiently.

The most challenging aspect of mountain region is the management of ground water. The consultant engineers, whose work was presented, recommended the construction of a small, parallel pilot tunnel well ahead of the main tunnel which houses the superconducting linac and its support equipment.

The consultant engineers have produced a design report which was summarized in the review material. The review committee report is due in a few weeks. The engineering team is expected to focus on costing the mountain region underground complex.

	2.2	Low Level RF	The Fermilab Test Stand group presented test results from a recently developed Lorentz Force detuning piezo control algorithm. The algorithm is based on a least-squares inversion of a finite impulse response sequence. Initial results appear excellent and may support plans to use piezo-tuners to provide stable phase and amplitude in multi-cavity systems. The group plans to apply the new algorithm at FLASH and in the S1Global cryomodule tests in fall 2010.
3.0	Accelerator Systems		(meeting minutes: http://ilcagenda.linearcollider.org/getFile.py/access?resId=0&materialId=1&confId=4642) The June meeting focus topic was Release 5 of the R D Plan and each Technical Group provided input for the Plan. Their input is summarized below.
	3.1	Sources	Electron Source:

The development plan is to build a laser system at SLAC over next year or so and use it for tests for polarised cathode charge limits before shipping the laser to JLAB for use on their high-voltage gun.

The order for the pump laser is now in process. The SLAC LCLS laser group will help to build up laser system.

Should have the laser shipped to JLAB by the end of the 2010. Goal is to have laser running and demonstrate operation with gun by end of 2012.

The primary risk mitigation concern is the charge on polarized

cathodes.. Suitable cathodes are already available for the ILC bunch charge. SBIR work on cathode development is continuing in the US, which will provide a second source.

Positron Source:

Target -

- The eddy current experiment at Daresbury Lab is ongoing. It shows a lower effect than simulations, which on the one hand is reassuring but on the other hand work is needed to understand why and then to revise the model. This is expected to be all be done before 2012, with the project considered to be in its final stage.
- Survivability: still needs more effort on both theoretical and numerical studies.
- Rotating vacuum seal – tests planned at Livermore, which should happen this year.

Flux concentrator -

- A flux concentrator would mean a shorter undulator and less power on target – Livermore needs to look into this.
- Omori noted that the distance between target and magnetic field in the current Livermore FC design is too large, resulting in a capture performance lower than the QWT.

Planned meetings -

- CFS face-to-face meeting at Daresbury 12-13.07, where the focus will be the e+ source and damping rings. http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4696
- 7th ILC e+ source collaboration meeting will be held at DESY (Hamburg) on 15-16.07. This meeting will specifically focus on the baseline undulator scheme and planning for TD Phase 2. https://indico.desy.de/conferenceDisplay.py?confId=3061
- POSIPOL workshop (KEK, May 31-June 2) http://atfweb.kek.jp/posipol/2010/

3.2 Damping Ring

- Critical R&D goals for E-cloud mitigation: To complete the critical studies in order to be able to make a final recommendation about the 6ns bunch spacing.

o Provide comparisons between 6ns and 3ns in a 3km DR in the same timeframe (hopefully).

o Main detailed report of e-could working group to be summarised and published.

o A major focus of phase-2 of the CesrTA R&D plan will be to incorporate e-cloud R&D results into ILC DR design(s), and include further refinement to the results.

o Phase-2 will continue into 2013, but it is not expected that the TDP will have critical issues that depend on the Phase-2 work.

- Demonstration of 2pm vertical emittance: At the Low-

			emittance rings workshop earlier in the year, it was reported that several light sources have each satisfied the 2-pm goal. Of particular note is the Australian Synchrotron that has achieved 1-pm vertical emittance, based on beam lifetime measurements. o The best option is to focus on ATF2 program rather than CesrTA for the 2-pm demonstration, and to continue to focus on E-cloud issues at CesrTA. • Fast kickers: Very good results from KEK for single bunch o Close to what's needed in stability, pulse width looking consistent with requirements for for 3ns bunch spacing o SLAC is developing a second implementation with different technology o Repetition rate demonstration is still required. Focus is on 3MHz but RDR low-Q required 6MHz. A discussion is needed if this option is still to be maintained.
	3.3	RTML	
	3.4	BDS	A workshop on R&D for the superconducting final quadrupole magnets was held in Annecy on June 14. http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4562 The synergy between B Factory and ILC Final Doublet technology was presented. Critical R & D status list for the Plan: • Demonstration of optics, final doublets, stabilization of 35nm beams. Demonstration of the nominal optics had been expected before the end of 2010. Demonstration of reliable stable operation is now to be delayed until 2011. • Magnets: permanent magnet is being prepared for test. Expect some results in the 2012 timeframe. • Development of interferometer will continue into 2012 • On track with development of dump---line systems • SC final doublet – there is an issue of how this will continue. Currently trying to find a solution. • Photon collider R&D program is presently on track. • Tests of collimators will likely be delayed and there is consideration of moving the tests to FACET. • Crab cavity development goals have been met successfully
	3.5	Beam Dynamics	
4.0	Test Facilities		
	4.1	ATF	The Fermilab-based team led by Manfred Wendt completed installation of the new ATF ring BPM electronics in early June. Initial testing with beam was carried out with good results. Further tests will be done when the Fermilab group returns to ATF in fall 2010. http://ilcagenda.linearcollider.org/getFile.py/access?contribId=33&sessionId=2&resId=1&materialId=slides&confId=4600

	4.2	ATF2	The ATF-2 project meeting was held at KEK in the week of June 30. http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4600
	4.3	CesrTA	The CesrTA team is now planning for the July run. Since the intense experimental program will come to an end in late 2010, this run is particularly important. The ring emittance has been reduced to 20 pm-rad, a factor of two improvement beyond typical 2009 performance. This enables, for the first time, studies of beam - ecloud dynamics in the low emittance regime. Bunch-by-bunch beam size measurements using the precision xray 'XBSM' monitor will be used to study emittance growth. https://wiki.lepp.cornell.edu/ilc/bin/view/Public/CesrTA/CollabMeetings#Meeting_Materials_AN1
	4.4	FLASH	FLASH operation for FEL use with long bunch trains should begin in late summer. The 9mA group will formulate a set of parasitic studies aimed at improving cavity voltage regulation and 'voltage slope'. Their meetings are posted: http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=186
5.0	Other		
	5.1	AD&I	The preparation for the first Baseline Assessment Workshop (BAW-1; Single tunnel HLRF system and Accelerating Gradient) should be completed by the end of August. In order to facilitate the generation of the Workshop report, preparatory discussions have been arranged at SLAC and KEK. http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4593
	5.2	Cost Management – AD&I	**Accelerator Design and Integration (AD&I) Activities:** Peter prepared a preliminary cost impact of 10 Hz Operations at Low Ecm which was discussed at the AD&I webex meeting on June 23. There was substantial ~ 2% increase in cost relative to the original RDR configuration (full power, 6.4 km racetrack Damping Rings, and two-stage Bunch Compressors). Some impacts, such as treatment of the photon load from the lumi e- beam on the positron production target station and the additional beamline to the (undetermined) beam dump for the posi e- beam, have not been designed, and are not included in this estimate of impact. Since the cost increase is mostly driven by the shorter damping times and extra power for the Damping Rings, this must be re-evaluated using the more detailed design changes presented by Susanna Guiducci at the June 23 webex. There are many other options to be evaluated, such as choosing the lumi energy at which the operating mode changes to alternating pulses and the repetition rate to in order to optimize luminosity vs. cost.

We were given two assignments in June:

1. Prepare for the discussion of the organization/fabrication/production model for the cavities and cryomodules at the Executive Committee meeting on July 23 in Paris.
2. Prepare a draft section for the Technical Design Phase R&D Plan for producing the TDR chapter on cost estimating. A draft is in preparation and is due a week before the EC meeting in Paris.

On June 30, Peter had a discussion with Dan Adelman, Professor of Operations Management at the Booth School of Business/University of Chicago, and two of his students. The main goal was to try to gain some professional insight on what might be the optimum procurement strategy for the SC cavities. I chose this as a critical cost estimating and management topic, entailing central or in-kind organizations, number of vendors (balancing cost vs. risk), and projecting costs as a function of quantity (learning curves). A good model for the procurement of cavities can serve as a management template for the few similar high impact, high tech, few vendor items such as klystrons and RF couplers. Procurement of the other items, while expensive, involves well understood technologies with adequate vendor bases, and which require only conventional optimization methods. Peter has prepared the following website for this meeting at Booth/Chicago. However, he is now writing notes from this meeting, but they are not yet posted. Keep tuned… http://www-ilcdcb.fnal.gov/Booth/Booth_home.htm

ICET

Triad's ILC Cost Estimating Tool (ICET) and applications to ILC RDR Estimate:

During June, all the Cost Estimating Modules (CEMs) loaded into ICET were checked for completeness and accuracy, including the CFS CEMs and elements. Background comments, documentation, posting to EDMS, and EDMS links for all the CEMs are still needed. An up-to-date graphical status sheet is at:

http://www-ilcdcb.fnal.gov/RDR-ICET-Status.pdf

There were several passes with Kevin Long (Triad) over a list of 9 minor issues or problems with ICET which were identified in April-May. Kevin sent a complete, new version of ICET on June 20 which was said to correct all of these. All, except one, were resolved. The case with $\geq$ 100 parts per CEM sheet still has problems. This still has to be resolved, but Peter and Kevin are talking and testing regularly.

A new bug preventing extraction to the database was observed by Peter and David found the error in code and suggested a solution which works and allows use of ICET to continue.
Update – July 2: Kevin found and fixed these two outstanding problems – now no known bugs in ICET!

It is planned that Triad will be requested to implement a few cosmetic format changes to the CEM forms to facilitate their use by the TAGL cost estimators for the TDR activities.

Peter still has to personally learn: REBUILDER, STAGER, and EDMS GENERIC PARTS.

CLIC - ILC **CLIC-ILC Cost & Schedule Working Group**:

We had a webex meeting on June 16 with Philippe, Tetsuo, Peter, and Wilhelm Bialowons participating. Notes from the meeting can be found at

http://www-ilcdcb.fnal.gov/CLIC-ILC/CLIC-ILC_Cost_and_Schedule_16june2010.doc

Main topics discussed included

1. Philippe's feedback from the Kyoto Risk Poster presentation and the Cavity Industrialization Meeting the day before IPAC'10. This evolved into a general discussion of relation between laboratories, governments, and industry in developing and producing high-tech components for a single project, fabrication/procurement models (how many vendors), risk mitigation, learning curves, plug-compatibility, in-kind contribution model, etc. This discussion was in preparation for upcoming discussion at the GDE Executive Committee meeting in Paris in July.
2. SB2009, reactions from AAP and PAC, and plans for the Baseline Assessment Workshops (BAWs)
3. Philippe reported that the CLIC configuration was frozen in early April. There were some civil engineering changes that still require estimating work. People know what they have to write, so they are beginning to write their texts. The hope is to have the first view of the costs by the end of June, with final costs available in September.

(submitted by Peter Garbincius)