Project Managers' Report

January 2009

ILC Global Design Effort

With this issue of the Technical Design Phase Monthly Report, you will find summary notes for the Group's monthly meetings (Main Linac Technology - Superconducting RF, Conventional Facilities and Siting, and Accelerator Systems), and a report from the Cost and Schedule Group (Peter Garbincius). These meeting notes show progress made and plans for upcoming meetings and work. This monthly report complements the weekly ILC Newsline. Please see the 'Director's Corner' for important planning and policy communication.

The Project Managers: Marc Ross, Nick Walker and Akira Yamamoto
January 2009

Global Design Effort
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Monthly Report from Project Managers for January 2009

Marc Ross

During the end-of-year holiday, the Project Managers issued a short note titled 'Plug Compatibility' which has our current thinking about the 'PC' concept for the R & D and mass production of high-tech components. The note is not intended to represent a consensus, but instead to put our thoughts on paper to answer questions and to facilitate discussion. The ILC GDE Project Director, Barry Barish, recently commented on it in his Director's Corner. We expect 'PC' to be an important part of the Technical Design Phase 1 Interim Review in April 2009.

Our most concentrated effort this month has been to prepare the next release of the ILC Research and Development Plan for the Technical Design Phase (Release 3). We expect it to be published in February following approval by the Executive Committee. The previous release was issued last June. The Plan is intended to be a 'living' document, reviewed and updated every 6 months as plans develop, new collaborators enlist, and resources become better known. To facilitate the review and update process, the Plan is hierarchical, with more detail provided for higher priority activities. For this release, look for updates to the SCRF main linac technology, beam test facility, conventional facilities / siting, and 'minimum machine' sections. The companion 'ILC Minimum Machine Study Proposal' will also be published in February.

In mid-January, we visited Spain and Italy. The visit included discussions with the Spanish Research Council (CSIC), Spanish Research Center for Energy, Environment and Technology (CIEMAT) and the Italian Institute for Nuclear Physics (INFN). These visits were very positive – it is important to note that Spanish investment in publicly funded scientific research has doubled in the last four years – and we could readily define collaboration topics to carry forward to our Technical Area Groups, notably on linac magnets and instrumentation. In Italy we discussed activities at Frascati (ILC, Dafne, CLIC and Super B) and Milan (SCRF). ILC has a long history working with INFN and we used this visit to renew and reinforce these connections. Recently, the Frascati-led SuperB team have begun the two-year process of writing the SuperB TDR and we were able to identify areas where both teams are working on the same design tasks, (in many cases by the same people), for example ring lattice design, feedbacks, low emittance tuning and beam dynamics.

On the technical side, we have planned and confirmed visits to the world's cavity fabrication companies – five in total – in each of the three regions. The visits will take place in about a month and provide a unique opportunity to introduce ourselves to these critical members of our community, to communicate R & D status and plans to them and, ultimately, to hasten the development of a more mature cavity fabrication process.

Our 'cavity string test' activity also known by the shorthand 'S1', passed an important milestone in January with the project manager's visit to DESY and the subsequent

definition of the DESY / KEK 'S1 Global' effort. We will publish an overview of S1 Global, summarizing the key inter-lab agreements, in February.

ILC-EDMS

In-part for the Minimum Machine studies, a CAD-3D visualisation model effort has begun, centered around the ILC-EDMS system. A collaboration of CAD engineers from CERN, Cockcroft Insititute (UK), SLAC and coordianted by DESY have embarked on an effort to produce a complete 3D CAD "visualisation" model for the ILC – and in particularly for the variants described in the ILC Minimum Machine Study Proposal for further integration of the central injectors region. The regional groups will supply a section of relevant (CAD) model to ILC-EDMS group at DESY, which will perform the integration of these models. Models of the beamlines will be initially generated from the existing RDR legacy lattice files descriptions, and later updated as the design work progresses.

Over the next months, we expect an increasing amount of the important machine design information to be stored in ILC-EDMS. To obtain an ILC-EDMS account. ILC-EDMS "Teams" have been set-up for each of Technical Area Groups. ILC-EDMS accounts can be requested in the following way:

- An individual contacts one (or more) of the EDMS Team Leaders, and the EDMS Team Leader who has been approached by this individual, when considered appropriate, submits a new account request to the EDMS support team, with cc: to the GDE Project Management Office. This is the standard path for granting new members for most of the EDMS Teams that are associated with GDE's Technical Area Groups, Costing Groups and other standing Groups.
- The GDE Project Management Office (PMO) submits a new account request for an individual to gain access to specific Teams to the EDMS support team. The PMO must inform the relevant Team leaders and gain their consent before doing so. This is the standard path for granting new members who are expected to carry out managerial tasks on EDMS.

Summary of ML-SCRF Technology Meeting (09.01.23)

Participants

L. Lilje, H. Hayano, N. Ohuchi, S. Fukuda, C. Adolphsen, E. Paterson, A. Yamamoto, M. Ross, W. Bialowons, J. Kerby, N. Toge, C. Pagani, M. Champion, R. Kephart, T. Shidara

Presentation files are available at the following Indico site;
http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3262

Brief Reports from PMs and GLs (A. Yamamoto, M. Ross and GLs)

- PM Report 1 (A. Yamamoto)
  - Input-Coupler Task Force Meeting was held (Dec. 19, 2008). See below for the minutes.
  - Plug-Compatibility Document was issued. The document is available at the following Indico site; http://ilcagenda.linearcollider.org/getFile.py/access?contribId=382&sessionId=12&resId=0&materialId=paper&confId=2628.
  - TD-Phase R&D Plan Release 3 (draft) was issued. The document in the draft stage is available at http://ilc.kek.jp/LocalMeetings/GDEReport/TDEPhaseRDReportRel3Draft.doc for your information. The document (release 3) is to be finalized within a few weeks.
  - Preparation for AAP review has been progressed.
- PM Report 2 (M. Ross)
  - TDP-R&D Plan was reviewed by FALC. (Jan. 19, 2009)
  - R&D on Quadrupole magnet was discussed with CIEMAT.
  - R&D on Cryomodule was discussed with INFN, Milano.
- Cavity Technical Area Group (TAG) Status (L. Lilje)
  - Nothing new to report on Cavity TAG. Cavity group Webex meeting is scheduled next Tuesday.
  - http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3224
- Cavity Integration TAG Status (H. Hayano)
  - Nothing new to report on Cavity Integration TAG. Some issues will be discussed at the S0 Webex meeting.
- Cryomodule TAG Status (N. Ohuchi)
  - S1-Global Cryomodule and Cryogenics Webex meeting was held this Tuesday (Jan. 20, 2009).
  - http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3337
  - Three KEK staffs, together with INFN/Milano staffs, will visit Zanon next week to discuss the S1-Global cryomodule issues.
- HLRF TAG Status (S. Fukuda)
  - R&D plan for Distributed RF System (DRFS) is underway and studies for klystron and power supply were asked to Toshiba. Tentative results will be prepared at the end of March and will be presented at the TILC09 in April.
- MLI TAG Status (C. Adolphsen)
  - Nothing new to report on MLI TAG.

Preparation for TILC09/AAP and Documentation (A. Yamamoto)

- Preparation for AAP Review: Major Context for SCRF
  - S0: High gradient, especially on expected progress in TDP-1, and revisit the base-line gradient for TDP-2.
  - S1: Progress and plan for the test, especially on S1-global.
  - S2: Plan for the SCRF system engineering and beam acceleration test.
- Preparation of the Documents

- Executive summary (by PM in word & ppt format).
- Presentations (by GLs in ppt files): Original Plan, Status and Expected Progress within TDP1, and further plan in TDP-2.
- Reference documents: Major presentations (ppt files), Proceedings and Technical notes.
- To be submitted to URL.

- Process to AAP Review
  - Jan. 31 Submit review documents to PMs
  - Feb. Update by/with PMs/GLs
  - Feb. 28 Submit to AAP
  - April 10 Finalize
  - April 17-21 Review
- Q: What is the expectation to have from this review? (Bob Kephart) -> To keep the soundness of the current TD-P R&D activities and plans by receiving external review.

Tuner and Coupler Plug-Compatibility Discussions (A. Yamamoto)

- Input-coupler Task-Force Webex Meeting was held (Dec. 19, 2008). Presentations and minutes are available at http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3236.
- Possible interface conditions: Cold-flange either with 40 or 60 mm diameter flange, Intermediate flange (additionally proposed), and Warm-end flange. Some CAD drawing home-works are necessary to investigate the space conflict around the end group in case of adopting enlarged diameter flanges at the boundaries. Jim Kerby is organizing the Fermilab team to provide further technical information.

S1 Global Program Agreements (A. Yamamoto)

- A general and technical guideline by PMs
  - Three regional participations: 2 cavities from DESY, 2 cavities from FNAL, 4 from KEK, a half cryomodule from INFN and another half from KEK.
  - Assembly and Tests at KEK site: Participations from DESY, FNAL and KEK.
  - Assembly starts early 2010 and test starts in middle 2010; Test need to be completed by the end of 2010.
  - Progress, Presentation/Reports will be shared by three regions.
- Bilateral agreements to be agreed between laboratories
  - First one for cryomodule was done between INFN-KEK.
  - Second one will be discussed in next week at DESY.

Plan for Visiting Cavity Manufacturers (A. Yamamoto)

- Visiting Plan (to be settled)
  - AES: Feb. 26, Niowave: Feb. 27.
  - ACCEL and Zanon in the first week of March.
  - MHI: March 11.
- Objectives

- To learn technical status at the vendors.
- To inform TD-Phase R&D Plan and plug-compatible conditions.
- To establish good communications and reliable relations in a long-term scope.

- Process
  - First, discuss with regional directors.
  - Second, discuss with institutional leaders and contact persons to prepare for the visit.

SCRF Meeting Schedule

- Next SCRF WebEx meeting: February 18, 14:00- GMT.
- GDE meeting and AAP (interim) review in Tsukuba: April 17 – 21, 2009.
  - The Local Organizing Committee would like to remind everybody that the deadline of the early registration is Jan. 31. Those who plan to attend the meeting, please go to the web page http://tilc09.kek.jp/registration.php. Those who need visa to Japan, please visit the site http://tilc09.kek.jp/visa.php. (N. Toge)

Summary of Accelerator Systems Meeting (07.01.09)

Attending: J. Carwardine, J. Clarke, P. Garbincius, F. Lehner (minutes), T. Omori, M. Palmer, E. Paterson, M. Ross, A. Seryi, T. Shidara, N. Solyak, N. Toge, J. Urakawa, K. Yokoya, N. Walker, A. Wolski

All slides are available on the indico site
http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3235

General Announcements (Nick)

Nick welcomed the attendees and wished a happy new year 2009.
He presented the upcoming January meetings which are of relevance:

- 19.01. FALC meeting in Madrid
  - 20. - 21.01. Visit/Discussions of GDE management with Spanish “network for future linear colliders”
- 22. - 23.01. Visit at INFN Frascati
  - Discussion with INFN director
  - SCRF (Milan)
  - Damping Ring discussions in Frascati
- 03-04.02 EC face-to-face (Pasadena)
  - AS TAG input to PMs is welcome for this meeting

Andy W. should check if he can join the DR part of the Frascati meeting by phone. Marc mentioned that final agendas for Frascati and Spain are not yet out. Marc R. noted that reports to the EC on CesrTA, ATF/ATF2 and TTF9mA have been requested and will be organised in the near future.

TAG Status Reports

Positron Source – Jim Clarke
Jim reported that some work at Argonne was done on the recent idea of a conventional source put forward by Masao Kuriki. There will be a webex meeting on 13 January at 13:00 GMT to discuss in detail Kuriki's plan. Presentations from Argonne are planned as well. N. Walker requested a status of the target and undulator prototype work for the next AS meeting.

Damping Ring – A. Wolski and M. Palmer on CesrTA
At the meeting today Andy just mentioned briefly the work on kickers R&D at ATF. Good progress has been made with installing the components for the new system for extracting individual bunches from the ATF damping ring into ATF2. Extraction tests are scheduled for this month (January). Previous tests of the (FID) pulsers suggest that they should meet the specifications on rise/fall time; experiments at ATF should provide useful information on stability and other important parameters. Given the experience at DAFNE, and previously at FNAL and ATF, reliability remains a concern. It is hoped this will not be an issue at ATF/ATF2, since the pulsers will be required to operate in short bursts, rather than the 1 ms long bursts that will be needed for ILC. Achieving the required rise/fall times will be an important milestone in the kicker R&D, but ongoing work will likely be required on stability and reliability.

Mark Palmer reported on the status of the CesrTA program. The slides are available at the aforementioned website. The commissioning run at CesrTA has just started on January 2. Next month will be a down-period to re-install repaired SRF cavity, electron cloud experimental hardware from PEP-II, photon beam stop for L0 wiggler and beam line front for the electron xBSM. The xBSM optics had to be completely redesigned after a direct X-ray strike incident. The new assembly will be prepared for the May run. Probably 2-3 days of running time will be lost during the May startup for installation, but this is not considered as critical.

RTML – N. Solyak
Nikolay reported shortly on the main findings of the studies on the effect of RF kick and cavity couplers on the emittance growth in bunch compressors. A symmetric coupling section for single-stage bunch compressors is being designed at FNAL. He has also started to work on the design for the single stage BC.

As regards the stray field measurements (possible long return line issue) new equipment is ordered and measurements in the vicinity of klystrons and modulators are continuing.

Nick suggested presenting a special and comprehensive report on symmetric coupler section. It will be useful to review the work. He will approach Akira about that.

BDS – A. Seryi
In December 2008, the main activity of BDS group was focused on ATF2, where the commissioning has started. The first goal was to minimize the beam losses and to pass

radiation inspection. This was successfully achieved and the inspection was done on Dec 11. Activities then focused on commissioning of the final focus beamline, in particular on calibration of the cavity BPMs and measuring and minimization of background at the Shintake Beam Size Monitor. Most of the cavity BPMs were calibrated, and initial tests of beamline tuning tools, built into the Flight Simulator, such as orbit measurements, matrix measurements, etc., have started.
The 7th ATF2 project meeting, at the end of December, was focused on a review of commissioning plans and on working out the strategy and internal milestones needed for focusing the planning for the commissioning work.

The ongoing January run is devoted to fast kicker studies, and February-March run will be devoted to commissioning of the remaining hardware, installation of the IP-BPM, systematic calibration of BPMs, beamline tuning, and further commissioning of the Beam Size Monitor.

While at KEK, we had an ad-hoc meeting with Radoje Belusevic, author of the preprint "A 160-320 GeV linear collider to study e+e- -> HZ and gamma-gamma -> H, HH" http://arxiv.org/abs/0810.3187 , KEK Preprint 2008-33, where it is suggested to consider a machine with maximum energy of 320GeV CM, which, by combining e+e- and γγ modes, can have very similar physics reach as 500GeV CM e+e- machine. In particular, the 320GeV CM γγ mode will access to the Higgs self-coupling, in similar way as the 500GeV CM e+e- mode of the ILC.

At this meeting several colleagues were present, including Eckhard Elsen, Kaoru Yokoya, Nobu Toge. The possible physics scope needs to be discussed by the community in a wide forum. While not the primary focus of the GDE effort, discussion on such proposals and the ways they can be staged is certainly encouraged.

AAP review – M. Ross

Marc reported on the AAP planning. The AAP review will be part of the TILC workshop. Marc met recently with the AAP chair and co-chair to get feedback from the panel. They will develop a charge to which we can work. Discussions are going on to develop an adequate review schedule with well-balanced topics. He will soon have more information on that.

R&D plan update (Nick)

- Front Matter being updated (PMs)
- Draft ready next week (Thursday EC meeting at latest)
- Front matter will include updated / expanded plans
- Minimum Machine work
- KEK-related e+ source work (waiting for input)
- Update to CesrTA / ATF / ATF-2
- Appendix B updates (TAG leader responsibility)
- Deadline was 5th Jan.

- Received back from Brachmann, Wolski ?

Draft goes to FALC for January 19 meeting. (It will also be scrutinised by AAP review committee.)

Minimum Machine Document (Nick)

- Section 3 almost complete (thanks to Editors for responding promptly)
    - CFS missing (next week hopefully)
- Will send around current incomplete draft to this mailing list
- Final editing (by me and Ewan) over the next week → Final publication end next week
- Next Steps?
    - PM/Ewan Review plans and scope
    - Send comments back to TAG
    - Form near term milestones for progress report
    - Begin discussing process for consensus building towards 2010 re-baseline
- Special case: Central Campus Integration (coord. Ewan)
    - How to proceed
    - 3D CAD integration team using this as model

A.o.B.

It was suggested that a special meeting to discuss $\gamma\gamma$-issues should be held. We should allow us some freedom to have discussions here, but primary questions should not be forgotten.

Summary of CFS & Global Systems Meeting (29.01.09)

Participants

E. Paterson, V. Kuchler, J. Carwardine, M. Ross, T. Shudara, N. Toge, A. Enomoto, B. Chase, W. Bialowons

PM Report (Marc Ross)

AAP (Accelerator Advisory Panel) Review

- The Executive Committee should approve the committee charge next week and it should be released shortly thereafter. The AAP committee has prepared a list of specific questions to be answered in the presentations to the committee. The Technical Area Group Leaders should have already received additional specific information via email from Marc Ross.
- The review will focus on the effectiveness of the TD Phase program leading up to a re-baselining of the ILC reference design in spring 2010.
- Each Technical Area Group Leader will be asked to make a formal presentation and be available to answer questions from the panel.

- Each presenter will develop a list of background documents that will then be provided to the committee ahead of the review. This background material will include major presentations, proceedings, and technical notes, and will be publically accessible from the TILC Indico site.

TILC09 Meeting in April 09

- Parallel sessions will follow the traditional format, albeit with slightly reduced available time because of the AAP review going on in parallel.
- A difference from other ILC meetings is that the PMs will be devoted to the AAP and therefore not generally available to participate in other parallel sessions.

FALC Meeting on January 19

- The FALC meeting on January 19th was the first meeting with the new Chair, Pierre Coulombe of the National Research Council of Canada.
- Marc made a presentation on the CLIC/ILC collaboration activities.

CFS (Vic Kuchler)

Process Water and HVAC value engineering

- Alternatives identified during the value engineering process, including the klystron cluster, have been evaluated.
- CLIC information is being added to the comparative spreadsheet. XFEL and Project-X will be added as information becomes available.

Main Linac Alternate Tunnel Configuration

- Schematic drawings are being developed for the seven tunnel configuration alternatives that have been identified. The goal is to have evaluations for three of the alternatives completed in time for the AAP review.

Minimum Machine Study

- An initial organizational meeting was held in December at DESY.
- Work is proceeding on developing the new lattices and layouts.
- Regular meetings are being held with DESY and CERN to organize the 3-D drawing effort, and with FNAL to develop a CFS 3-D capability.

AAP Review Preparation

- Decisions need to be finalized on which information to post for the reviewers. Information will be included on process water value engineering, tunnel configuration studies, minimum machine, status of collaboration activities, and resource loaded schedules for CFS work through 2010.

ILC/CLIC Collaboration (slide from John Osborne)

- The main collaboration efforts in 2009 will include:

- Developing a safety document compiling information that exists from other large projects. The chapters on CLIC and ILC will follow the same document structure.
- Performing transport and installation studies, similar to the study that was performed for CLIC in 2008 and the study that was done for the ILC RDR.
- Developing 3-D models using CATIA software for the tunnels and caverns for the positron source area, initially for the RDR layout and subsequently for the Minimum Machine options.

TTF/FLASH 9mA Program report (John Carwardine)

Beam dump repair

- DESY personnel are developing a plan for repairing the beam dump line in August during a three-week dedicated shutdown period. If this goes ahead, there would be a 1-2 week dedicated study period for the 9mA program. DESY Management will make the decision in late March on whether the repair and 9mA studies period will go ahead.

January studies

- There were two 16-hr studies shifts for the 9mA program earlier in January. Studies were limited to 10 bunches at 3nC/bunch. Studies goals were to study beam losses in the beam dump line, LLRF feedback and feed-forward studies, including increasing the regular gain, and gradient studies to attempt to identify potential practical limits for the anticipated 9mA study in September.
- With the beam dump not yet repaired, studies were limited to 10x 3nC bunches per pulse.

Mini-workshop on January 16

- The purpose of the one-day mini-workshop was to review technical system status and begin planning for the anticipated 1-2 week studies period in September.
- The agenda and presentations are posted on Indico here: http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3234
- Improving instrumentation in the beam dump line was a major theme, with discussions on possible locations of new bpms, a diamond-blade beam halo monitor on the dump exit window, and beam loss monitors. Also considered were options for providing additional steerers.
- High power RF component ratings may become a limiting factor in running with cavity gradients close to quench. There is a wide range of maximum gradients in the three cryomodules that will be the subject of high gradient studies.
- An important consideration from a planning perspective is that there will be no available machine studies time additional testing or commissioning of new systems between now and the anticipated 3-week shutdown in August. Careful planning and coordination will be critical for activities during the shutdown and during the subsequent studies run. Availability of personnel will be an issue for 24/7 operations coverage during the studies run.

- Planning for the dump line repair, other preparatory work, and the studies period will continue over the coming weeks.

Cost & Schedule Monthly Report (January, 2009)

By Peter H. Garbinicus

Triad's ILC Cost Estimating Tool (ICET)

J. Carwardine, T. Himel, T. Shidara, P. Garbincius, and Triad: S. Curtis, L. Lew, and K. Long

Regular WEBEX meetings were held with Triad on Tusedays: January 6, January 13, and January 20.

On January 19, Triad rolled-out (e-mailed to us) the first version of the ICET costing tool, including development and writing to personal desktop databases and generation of reports from the information in the database. We have been trying-out this system, understanding its operation, searching for bugs.

John and Maura Barone are investigating a common database for this use, either off-site (problems with
non-exclusive ILC control) or at Fermilab (behind DOE regulations, but accessible by VPN accounts).

I also requested additional funding to keep Triad working on this project at the same level of effort for another 2 months.

CLIC-ILC Cost & Schedule Working Group

Hans Braun, Germana Riddone, John Carwardine, Tetsuo Shidara, and Peter Garbincius
There was a joint WEBEX with CLIC CES, ILC CF&S, CLIC-ILC Cost & Schedule Working Group – January 14.
http://indico.cern.ch/getFile.py/access?contribId=4&resId=1&materialId=slides&confId=44866
John Osborne discussed a single tunnel concept for CLIC without isolated escape path and periodic smoke barriers, Fabio Corsenego on safety rules and plans for CLIC safety document, and a very interesting talk by Keith Kershaw on moving objects around in tunnels (he also included Fermilab and DESY experiences).

CLIC-ILC Cost and Scheduling Group WEBEX – January 15 – even Jean-Pierre Delahaye participated!

Frank Lehner reported on the latest treatment of risk by XFEL and by FAIR. Personnaly, I thought the total width from 5% to 95%-ile of the cost distribution was abnormally narrow. There was no answer to how the funding agencies would use this risk distribution information, whether they were holding some reserve to cover some percentile of the distribution and whether the projects could request some of that reserve to cover non-optimal cost experiences.

The next CLIC-ILC Cost & Schedule Working Group WEBEX meeting is scheduled for Thursday, February 19, 2009, at 1400 GMT. Although we intend to schedule on the 2nd Thursday of each month, our CLIC colleagues requested that this meeting be delayed one week. We don't have a topic yet.

Gamma-Gamma: Photon Linear Collider (PLC) Report

On January 27 a draft was received from Michael Peskin via Eckhard Elsen with γ-γ physics motivation, a 6 stage plan for going from γ-γ at 180 GeV to both e+e- and γ-γ at 500 GeV, and a blank section for cost estimates. I've started working on these estimates and expect to report progress by webex at the EC meeting on Tuesday, February 3. The PLC already assumes a 3 km DR and the low-P option, so there must be this baseline plus RDR configuration for comparisons. I've already asked for help from Eckhard and Andrei Seryi in better understanding the requirements. Also on January 27, Jeff Gronberg sent a brief note on a laser for Compton backscatter, with a non-detailed (and in my estimation, unbelievably low) cost estimate. These drafts (without the accelerator cost estimates) were combined into a second draft which was sent to ILC AAP on January 29.