



Project Managers' Report

February 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 Newslines. Please see the 'Director's Corner' for important planning and policy communication.

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

**Global Design Effort
PO Box 500
Batavia IL 60510**

Monthly Report from Project Managers for February 2009

Akira Yamamoto

Our major effort and progress last month was the new updated release of the ILC Research and Development Plan for the Technical Design Phase (Release 3), following approval by the Executive Committee. 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, we focused the update on the SCRF main linac technology, beam test facilities, conventional facilities / siting, and 'minimum machine' sections. The companion '[ILC Minimum Machine Study Proposal](#)' has been also published during the last month.

In end-February, we started a series of visits to SCRF cavity manufacturer, with the following objectives:

- Learn industrial status and possible future at cavity manufacturers, through visiting the factory, presentations and discussions with factory staff;
- Communicate our TD-Phase R&D Plan, and outline the necessary boundary conditions, "plug-compatibility", in the world-wide R&D stage;
- Request closer collaboration between the cavity manufacturers and laboratories to further industrial R&D effort, particularly, to improve "field gradient" and "cost effective production" in preparation for industrialization (mass production);
- Establish closer communications and confident relationships between ILC-GDE and the manufacturers.

We visited Advanced Energy Systems (US), Niowave / Roark (US), in this month, and we plan to visit Accel (EU), Zanon (EU), and Mitsubishi Heavy Industries (Japan) in March. We are grateful to our hosts for their generous hospitality and would like to extend our deep thanks to them and to the institutional managers who helped organize the visits. In order to establish a standard documentation package to be distributed to each company, we have assembled the following web page:

<http://www.linearcollider.org/cms/?pid=1000613>

The preparation for the AAP review to be carried out during TILC09, Tsukuba, is in progress, and we will need to post the presentations and reference material in March to be reviewed by the AAP.

Minutes of ML-SCRF Technology Meeting (090218)

Date & Time:

14:00-15:05 GMT, February 18, 2009, using WebEx.

Participants:

H. Hayano, N. Ohuchi, T. Peterson, S. Fukuda, C. Adolphsen, A. Yamamoto, N. Walker, J. Carwardine, W. Bialowons, J. Kerby, E. Paterson, N. Toge, S. Mishra, G. Apollinari, M. Champion, R. Kephart, R. Rimmer, R. Geng, T. Shidara

Presentation files are available at the following Indico site;

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3399>

1) Report from Project Mangers (A. Yamamoto)

- DESY visit (Jan. 26-27)
 - MOU Addendum for S1-Global was the main issue.
 - Work sharing and responsibilities were agreed on cavity contribution and participation to the cavity assembly and test.
- Cavity company visit
 - Date for ACCEL visit will be on March 4 and presentation from GDE is being prepared.
- InPAC-2009
 - Indian Particle Accelerator Conference 2009 was held at RRCAT, Indore. A. Yamamoto gave a talk on “Global R&D effort of SCRF technology for the ILC”.
 - Discussion with RRCAT director, Dr. V. Sahni, was held for long term cooperative effort on cavity and cryomodule design work in view of cost-effective manufacturing and on exchange of scientists and engineers.
 - Discussion on cavity, tuner and cryomodule was also held with K. C. Mittal (BARC), G. Mundra, V. Jain (RRCAT), V. Mishra (BARC) and K. Prashant (RRCAT).
 - FNAL Director, P. Oddone, participated the conference and the MOU established between FNAL-Indian Institutions on the first day of the conference.

2) Brief Reports from TAG leaders

- Cavity Technical Area Group (TAG) Status
 - S0 Webex meeting is scheduled next Tuesday, February 24. (M. Champion)
 - One cavity recently reached over 40 MV/m gradient with only one EP process and ultrasonic detergent surface treatment at J-Lab. (R. Geng) >> IT IS A GREAT NEWS!!
- Cavity Integration TAG Status (H. Hayano)
 - Response of the piezo tuner is now under measurement at STF in order to check the hysteresis behavior.
 - Magnetic shield effect with/without cavity magnetic shield was measured at the STF vertical test (VT) stand. Residual resistances are 8 n Ω , 10 n Ω and 13 n Ω , with both magnetic shields, with only VT magnetic shield and with only cavity magnetic shield, respectively.
 - Slide-jack-type tuner position of the STF TESLA-like cavity for S1-global and S2 is under discussion in conjunction with the Plug-Compatibility concept.
- Cryomodule TAG Status (N. Ohuchi)

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- Three KEK staff with INFN/Milano collaborators visited Zanon in the last week of January and manufacturing drawing of the S1-Global cryomodule will be defined by the end of February.
 - S1-Global Cryomodule and Cryogenics Webex meeting will be held next Tuesday (Feb. 24, 2009).
 - RRCAT (K. Prashant) is going to join the meeting for cryomodule design and development as a part of participation to the ILC R&D.
 - HLRF TAG Status (S. Fukuda)
 - Two types of power distribution systems (tree and linear) were successfully tested at the STF-1.
 - One MBK (Multi-Beam Klystron) and a bouncer type modulator will be ordered soon by the recent approval of the Japanese supplemental budget.
 - R&D plans for ACD are under way. Studies for DRFS klystron and power supply design and cost are on going by Toshiba. Circular waveguide for klystron cluster scheme is also under investigation. KEK staff will visit SLAC next month to see the R&D activities on Marx generator.
 - A. Yamamoto will make contact with S. Fukuda and C. Adolphsen concerning the comparison of pros and cons between the two RF distribution schemes based on advice and question on the priority given by M. Harrison and M. Ross.

3) AAP Review for SCRF Session (A. Yamamoto)

- Context for SCRF given by AAP
 - (1) What is the path to finalizing the gradient choice? => (S0)
 - Current experimental status
 - Established standards
 - Extrapolation of results
 - Time limitations
 - Decision process
 - Role of plug compatibility in this process
 - (2) What is the path towards industrialization? => (S1~S2)
 - Current Experimental status
 - Established standards
 - Extrapolation of results
 - Internationalization of efforts
 - Outline tendering process
 - Role of plug compatibility
 - (3) Lessons expected from system tests => (S2)
 - Operational limitation of the ILC cavities
 - FLASH
 - STF
 - NML
 - Experience and characterization of implication for ILC
 - Time lines
 - Benefits
 - Outline of SCRF presentation
- Session 1 (April 19, AM)

- 10:00 Introduction by PM (A. Yamamoto)
- 10:15 [Cavity Field Gradient (S0)]
 Improvement of gradient with understanding of behavior (L. Lilje)
 Process for field gradient re-optimization (A. Yamamoto)
 - Number of statistics and definition of the statistics
- 11:00 [Cavity and Cryomodule Industrialization (S1)]
 Cavity Integration and Cryomodule Assembly
 - S1 and S1-global Plan (N. Ohuchi)
 R&D Efforts for mass production
 - Plug compatibility of cavity and cryomodule (H. Hayano)
- Session 2 (April. 19, PM)
- 14:00 [Test Facilities for SCRF with Beam Acceleration (S2)]
 FLASH at DESY (J. Carwardine) => Needs adjustment with other session
 STF at KEK (H. Hayano)
 NML at FNAL (M. Champion)
- 15:00 Reserved for further presentations
 Cryogenics (T. Peterson)
 HLRF (S. Fukuda)
 ML Integration (C. Adolphsen)
- Preparation of the Documents
 GLs are requested to supply reports till the end of February. Templates will be sent by A. Yamamoto soon.

4) Plug-compatibility document (A. Yamamoto)

- Appendices should be updated in a uniform manner.
- Improvements on functional and envelope parameters
- Cavity Integration (H. Hayano)
- Cryomodule (N. Ohuchi)
- HLRF (S. Fukuda)
- MLI; Quadrupole package (magnet and monitor) (C. Adolphsen)

5) Presentation File for Cavity Manufacturer Visit (A. Yamamoto)

- Presentation file, which is prepared for informing cavity manufactures our TD-Phase R&D plan and activities together with plug-compatible conditions when PMs visit cavity manufacturing companies, was presented.
- S. Mishra commented that the Indian R&D activities should be included taking into account the recent growing effort in Indian laboratories.
- T. Peterson indicated the necessity for revising the resource tables of the TD-Phase R&D Plan document, since a drastic situation change might be expected by the recent approval of economic stimulus bill. >> Akira Yamamoto will discuss more with Fermilab members during his visit to Fermilab on Feb. 24 and 25.

6) SCRF Meeting Schedule

- Next SCRF WebEx meeting: March 18, 14:00- GMT.
- GDE meeting and AAP (interim) review in Tsukuba: April 17 – 21, 2009.

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- We would like to remind everybody that the new deadline of the early registration is February 28. 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>.

15. Accelerator Systems WebEx Conference 04 February 2009, 13:00 GMT

Minutes (v1.0)

Attending: W. Bialowons, P. Garbincius, K. Kubo, M. Kuriki, 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

All slides are available on the indico site

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=3350>

1. General Announcements (Nick)

Nick welcomed the attendees and reported on the on-going the face to face Executive Committee meeting at Pasadena. The EC will meet with CERN DG and CLIC steering group later in the day (by videoconference) to talk about increasing CERN/CLIC involvement. Nick further announced that Andy Wolski is stepping down as technical area group leader for DRs due to many other obligations. However, he still will be involved in technical work. Susanna Guiducci/LNF is taking over at the time of the Tsukuba TILC '09 meeting.

2. Short status report by TAGLs

2.1 Damping Ring – M. Palmer on CesrTA (slides available)

Mark Palmer gave an update on the status of the CesrTA program. The slides are available at the aforementioned website. The current experimental run was completed by 02/02/09 with major focus on low emittance correction in baseline optics, X-ray BSM commissioning and electron cloud measurements. The participation in the measurement program was good with about 13 external visitors. They are now moving towards the second upgrade with installing PEP-II experimental hardware and other equipment. Mark reported further on first measurements of the beam emittance using Touschek lifetime parameters. They achieved after the successful tune-up a vertical emittance of 32-38pm, (compared to the final goal of 20pm), which for a first attempt is considered very good. Cross checks with X-ray BSM were done and are in agreement with data

from the Touschek lifetime measurements. Measurements on electron cloud densities (RFA and TE wave measurements) were carried out and compared with simulation. These studies are still ongoing. The next generation of testing chambers to be installed soon will allow tests with new EC mitigation techniques. A much more in-depth discussion on the experimental details will take place next Tuesday at the CesrTA Collaboration webex meeting.

2.2 RTML – N. Solyak (*slides available*)

Nikolai gave a RTML update report. Progress is made on the single-stage bunch compressor design and related performance studies. He is also working on the redesign of the extraction line for the beam assuming a 4% energy spread after the single-stage bunch compressor. A design for a symmetric high-power RF coupler for the SC cavity in bunch compressor is almost finished (as a possible mitigation for the strong RF coupler kicks). New hardware has been received for the magnetic stray field measurements (important due to tight tolerances $<2\text{nT}$ for time-varying fields), and the software upgrade and calibration tests are in progress. Measurements nearby a klystron are planned for mid February. In addition Nikolay mentioned possible first studies on cavity amplitude and phase stability for RTML bunch compressor at FLASH during a 9mA run in September 2009. A proposal is currently being discussed.

Nick asked where the claimed 4% energy spread is coming from. A clarification of this number will be given offline.

2.3 BDS – A. Seryi

For the past month, the BDS efforts continued on several fronts. The ATF2 commissioning, with studies focused on fast kicker in January, resumed in February, aiming for commissioning of the laser wire mode of the Shintake beam size monitor and tuning of the beamline. A lot of effort is put into the organization of the commissioning team, for proper scheduling of task, shifts, as well as for training of younger colleagues. The IR Integration leaders, in connection with MDI-D group, are working on finalization of the IR Interface document, aiming to finish it in the beginning of February. Also, the magnetic design of SC FD for the ATF2 upgrade is being finalized and transferred for further detailed 3d cad design. The Accelerator design & integration team discussed plans to produce a slightly shorter beam delivery system, with increased synchrotron radiation emittance growth at 1TeV. The conflict between polarimeter and MPS functions have been resolved by placing a dedicated polarimeter chicane just upstream of the tune-up extraction line.

Within the Accelerator design & integration, a vacuum science task force has started, which, in close connection to IR Integration and MDI-D teams, will focus on investigation of vacuum system requirements and configuration for the IR area.

Together with ILCSC commissioned physics study group, BDS experts have contributed to the evaluation of the first-stage low-energy photon collider, first proposed by Sugawara-san. A report is ready for submission to ILCSC. Within the Accelerator design & integration work package, the Energy-saving magnets & Power Supplies sub-work package leaders have started discussions on the planned work, which would include developing concepts of PS-Magnet package to minimize the overall cost, as well as to study other ideas that will allow energy saving, like high-T SC magnets.

2.4 Simulations – K. Kubo (slide available)

Kiyoshi reported that little progress has been reported since the Chicago LCWS meeting (little manpower is available). The group is making a reliable list of the tolerances (hardware specs), but there was a little progress on magnet strength accuracy. An ILC-CLIC beam dynamics workshop is tentatively planned for the summer. Kiyoshi emphasized that more work is needed on the low emittance preservation in RTML and on known specific problems, e.g. the scale error of BPM in ML and the coupler wake in bunch compressors. He is trying to find people to be responsible. Nikolay Solyak is looking to provide resources for these RTML-based studies.

3. AAP review update (Marc)

Marc gave news on the planned AAP review. The so-called AAP context document listing questions we should address during this review was mailed a few days ago. He emphasized that we should use it to begin collecting and collating material which will be submitted to the AAP. All group leaders should now prepare material according to these regulations.

Moreover, a charge will be prepared very soon by the AAP as well as draft agenda on the indico website.

4. Low energy electron driven positron source (Masao Kuriki) – slides available

M. Kuriki presented an overview of his idea for a low energy electron driven positron source that was proposed by him at ILC08. Later studies included damping ring acceptance calculations and further critical investigations were done by ANL group. Masao compared positron yields from two studies which were consistent with each other at a 20% level.

The ANL study concludes also a capturing enhancement by ~40% using liquid lithium lens instead of AMD. However, increasing the RMS spot size will lower this enhancement factor. Heat transfer simulations show that for such energy depositions boiling of the liquid lead target has to be considered as a serious problem. Larger spot sizes and increased liquid lead flow speed can mitigate it but would require significant R&D. Masao reported on his studies to optimize positron yield and deposited energy using finally a 2.2 GeV and 4.0nC drive

beam. He concludes that a liquid lead flow of 30 m/s is required to avoid the boiling point.

Junji Urakawa reported on the planned target/window R&D programme at KEK in collaboration with BINP. Nick requested information concerning the parameters and detailed scope of the tests, and how they relate to the current ILC requirements.

5. Possible Minimum Machine Studies of Central Region (Ewan) – slides available

Ewan presented the general schedule for the 2009 studies with the goal to propose a new baseline for evaluation in 2010. The schedule and goals are written up in the ILC Minimum Machine Study Proposal v1 as of January 2009. The plan mainly addresses source and BDS integration (Central Region). Main Linac studies include low power option, single stage bunch compressor, TeV upgrade and value engineering, which will continue through the first three quarters of 2009 independently but will have to be ready for inclusion in the 4th quarter of 2009. Ewan summarized the ideal goals:

- In quarter 1 have 3d layout of some difficult ILC facilities using the current RDR lattice descriptions.
- In quarter 3 and 4 have a feasible 3d example layout of consolidated central region.
- Have then in quarter 3 and 4 enough information to produce a rough estimate of cost differences, impact in installation and operation including personnel safety

6. A.o.B.

The next AS-TAGL meeting is scheduled for:

- Wednesday, 04.03.2009 at 14:00 GMT

CFS & Global Systems Webex Meeting 25 February 2009

Agenda

PM Report (M Ross)

CFS preparations for AAP (V. Kuchler)

FLASH: preparations for AAP (J. Carwardine)

Attendees

E. Paterson, V. Kuchler, J. Carwardine, M. Ross, T. Shidara, N. Toge, W. Bialowons, A. Yamamoto, N. Walker, E. Elsen, J. Osborne

Meeting Summary

PM Report (Marc)

AAP (Accelerator Advisory Panel) Review

- The agenda is now up on ilcagenda and presenters have upload access for supporting documents and talks.
- It is important that a well-organized and focused package of background documents is uploaded soon, so that the reviewers can have sufficient time to absorb the material before the review.
- CFS plan for providing supporting documents can be an example for others.
- The presentation on FLASH will have to address both Global Systems goals and SCRF goals.

TILC09 Meeting

- There will be focused parallel sessions on CFS and on the Minimum Machine. All the parallel sessions should include relevant discussions of the Minimum Machine.
- There should be sessions with the larger group (including all Area Group Leaders) for the purpose of discussing the overall integrated design. One aspect of this will be to keep people informed and involved in the integrated machine design activities associated with the Minimum Machine effort.
- The Main Linac and HLRF options are not independent of the Minimum Machine effort, since they impact the central region integration.
- A key topic for all the parallel sessions should be to consider the process of re-baselining the ILC design in 2010, particularly where there could be major design changes.

Minimum Machine

- Goals for the Minimum Machine effort in 2009 (per Ewan): during the first two quarters, a CAD team will develop a 3D cad model of the RDR beam delivery system tunnel; during the third quarter they will begin integrating the central injector complex and start working out any difficulties; during the fourth quarter, they will begin looking at cost differences for the different options for the central region and to provide information for the re-baselining decision.
- The Minimum Machine effort be a focus of this AAP review, since we are not ready to discuss integration.

Misc

- Integration will be a major topic for the Albuquerque GDE meeting in September.
- The PMs will be meeting with several cavity vendors during the coming weeks.

CFS (Vic)

- The CFS group has proposed a different set of presentations than in the AAP panel context document. The talks will be cover all the material requested by the panel, but will be organized more along the lines of the CFS activities.
 - TDP-1:
 - Value Engineering
 - Collaboration with CLIC, XFEL, Project-X
 - Develop baseline configurations

- Site development and site selection processes
 - TDP-2
 - Develop revised baseline
 - Develop a revised cost estimate
 - Develop a project schedule
- CFS background documents will be posted to a CFS website rather than being uploaded to the ilcagenda site which cannot support file folders for organizing the documents.
- The plan is to have documents uploaded this week and to then have a pre-meeting with Eckhard Elsen and Johathan Dorfan next week.

FLASH: preparations for AAP (John C)

- The charge and content of this presentation have not yet been finalized. [Following the CFS & Global Systems meeting, Nick, Akira, Marc, and John C met to discuss the charge and scope of the presentation.]
- The presentation should describe the beam test program (cryomodule string test), the ILC SCRF context of the FLASH program, and the 9mA program itself.
- The presentation should address which of the R&D Plan goals can be met at FLASH, which would not be, and what potentially could be done at FLASH.
- The presentation should attempt to introduce the broader topic of System Tests, since it will come before the two other facilities talks from Fermilab and KEK and before other SCRF presentations on the S0/S1/S2 programs.

The next CFS & Global Systems meeting will be on March 25th.

John Carwardine

Monthly Report (February 1-28, 2009) for Peter H. Garbincius

PHG_monthly_report_28feb09.doc

distributed 28feb09 to: Marc Ross, Tetsuo Shidara, John Carwardine, Wilhelm Bialowons, Frank Lehner

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 February 6, February 16, and February 24. In addition, Spencer Curtis was in Chicago on February 18 on other business, and stopped in to discuss progress with Peter and greeted Barry and John C.

During February, Triad rolled-out two new versions of ICET_v1.1, and _v1.2 (23feb), adding more features and fixing prior bugs in each new version. These packages were stored as zip-files in EDMS. Since Peter has been pre-occupied with Fermilab Directorate duties and John is MAC-bound (ICET requires EXCEL macros and visual

basic scripting, which MAC doesn't support), most of the check-out burden has fallen on Tom. John and Tom gave a demonstration of the features of ICET_v1.1 at the PMO/Cost Management WEBEX meeting on February 11.

On February 24, John C reported that "Maura has organized an off-site mysql server for ICET. We connect to it the same way as with the local mysql server, i.e. using ODBC connector. She's also set up the server to require ssh tunneling in order to provide some data protection." Maura also provided instructions for setting up the connection under Windows, along with accounts and passwords for John, Tom, Tetsuo, and Peter.

Spencer Curtis sent us a menu of additional tasks, with estimated person-hours, with 2-4 sub-tasks each in areas of Data Support, Report Development, Additional Software, Process Development, and Documentation. At this time, we chose to go ahead with standardized test data, reporting (requirements, "canned" reports, and report development tools), validation and error checking, configuration control, and user guide and code documentation. We deferred decision on other sub-tasks until later. As result of the Feb 11 PMO/CM webex, we will pursue getting Triad and Lars Hagge together again to implement EDMS as a more sophisticated and useful tool interfaced to ICET, rather than just a repository of zip-files.

Peter also requested additional funding to keep Triad working on this project at the same level of effort for another 2 months. Maxine has this moving through the approval chain, and hopefully it will get to Triad by March 2. We also started the procurement paperwork/approval process on external hosting of Primavera by the Loadspring company. We are also requesting a summer student to help with entering the current RDR cost estimating data into ICET, along with working with Maura on various documentation tasks.

CLIC-ILC Cost & Schedule Working Group:

The next CLIC-ILC Cost & Schedule Working Group WEBEX meeting is scheduled for Thursday, March 13, 2009, at 1400 GMT.

Gamma-Gamma: Photon Linear Collider (PLC) Report:

During February, I modified the RDR Cost Estimate spreadsheets to produce estimates for $\gamma\text{-}\gamma$ at 180 GeV and $e\text{+}e\text{-}$ at 230 GeV. I presented the 180 GeV $\gamma\text{-}\gamma$ estimate at the EC webex meeting on Tuesday, February 3. This estimate was included in the latest version of the Photon Linear Collider document:

<http://www.slac.stanford.edu/~timb/PLC/PLCreportv8.pdf>

I sent this estimate and the 230 GeV $e\text{+}e\text{-}$ estimate to Eckhard Elsen, who presented them at the February 12 ILCSC meeting at KEK. I joined by webex, but there weren't many questions or discussions for me.