

Monthly Report from Project Managers

November, 2007

Marc Ross

EDR R & D Plan

- 1) The most substantial activity completed in November was the creation of the ILC EDR R & D Plan. This is a 15 page plan, with resource tables, that indicates the highest priority R & D and includes tables of resources that illustrate the global basis of our effort. The document includes a 40 page appendix that lists the Work Packages submitted by each of the Technical Area Groups and details, a bit more, the highest priority items.
- 2) In the plan, we singled out 1) high gradient SCRF cavity processing and testing ('S0'), 2) CFS-based value engineering of the conceptual RDR design and 3) the beam test facilities as having highest priority for completion during the ED Phase. The list of test facilities includes: ATF, ATF2, STF, ILCTA-NML, TTF / FLASH, SLAC-ESA and CESR-TA. A summary schedule is included.
- 3) We expect the R & D plan to be made public to the community in a few weeks. It was submitted to the FALC – Resources Group in early December.

Planning for the upcoming GDE workshop, to be hosted by Tohoku University in Sendai, Japan March 3 – 6, 2008.

- 1) The TILC08 web site and related meeting information has been prepared by the hosts. For the meeting, the Project Managers have prepared a short 'goal' statement:
 - a. "The ILC accelerator design effort has now entered an engineering design phase leading up to the publication of the Engineering Design Report in 2010. The Sendai GDE meeting will focus on technical progress since the October meeting (at FNAL), while consolidating plans (both technical and organisational) for the next phase of the project."
- 2) As mentioned at ALCPG07, we hope to present the ED Phase schedule at TILC08 and expect upcoming meetings, to be held in the next 2 months, to focus on development of the plan.

Other meetings

- 1) We would like to increase our connections with the CLIC collaboration, centered at CERN. To do this, we have, together with CLIC, developed a list of work package titles where we might find strong mutual interest. These include CF & S, Beam Delivery and Cost / Schedule. The relevant detector groups will also attempt a similar activity.
- 2) We have plans for 4 (perhaps 5) technical R & D PM review meetings in April and May, 2008. 'PM review' means that the meetings will be chaired and summarized the one of the Project Managers. The agenda will be kept focused on a small The reviews are:

- | | | | |
|----|--|--------------|-------------|
| a. | Superconducting RF R & D | Fermilab | April 21-25 |
| b. | (If there is not enough time for HLRF, then HLRF at SLAC April 28, 29) | | |
| c. | BDS | CI | May 5, 6 |
| d. | DR | CI | May 29,30 |
| e. | e+ | DESY Zeuthen | April 7-9 |

Beam Delivery System monthly report, November 30, 2007

Andrei Seryi

Monthly report from Beam Delivery technical area, for November 2007

Prepared by Andrei Seryi, BDS Technical Area Group Leader, for ILC Project Managers

Following the GDE/ALCPG07 meeting, the Beam Delivery group started its organization to meet the EDR goals. The general structure of the Beam Delivery was created and now includes ten Generic Work Packages, nine of them technical, and one which includes management, integration and CFS interfacing performed by TAGL, System Engineer assisted by System Engineering Office and technical leaders of GWPs.

The interim technical leadership structure for Beam Delivery was appointed, with consultation and approval by Project Managers. The structure is described in [1] and also outlined in the Appendix. The search for the System Engineer is ongoing, several engineering candidates were interviewed and selection is expected soon.

The Technical Area Configuration manager was appointed and is now collecting the RDR configuration and cost related information to be uploaded to EDMS as soon as details on handling the cost related information will be clarified by PM Office.

Efficient connection to the detector side is very important for Beam Delivery and in particular for its IR Integration GWP. Communication has started with Research Director to find the best way of connection and to appoint responsible people on the detector side. This process is ongoing.

The first task the newly appointed technical leaders of the Beam Delivery GWPs were asked to do is to present proposals for a) optimization of EDR deliverables and schedule; b) organization of the groups work and the reporting structure taking into account submitted EOIs; c) selecting meeting times for each GWP; d) launching the group activities, etc. The initial proposals were discussed at the BDS coordination and integration meeting (GWP01 meeting) on Nov 19 and 20. In particular, detailed proposals were presented by Accelerator and physics requirements and design integration, Magnet & PS and Instrumentation GWPs. The initial suggestions will be further iterated and developed. The goal is to establish a good detailed plan and structure before the Sendai GDE workshop on March 3-6, 2008.

The BDS group is preparing for the PM driven review on May 5-6, 2008, which will be focused on three topics: Final Doublet, Crab Cavity and long footprint machine-detector instrumentation. In preparation, the group will have workshops with internal BDS driven reviews, where independent experts will be invited. We are planning the following reviews: Crab cavity design review at the end of March in Daresbury (dates to be finalized); Final doublet design review on April 2-4 at BNL; Workshop and design review of polarization and energy measurements on April 9-11 at DESY Zeuthen.

The GWP leaders and groups started detailed technical work and reviews of the existing design, to address the EDR goals of system optimization and value engineering. The work is now concentrated on reviewing the designs and requirements and the cost drivers; with the goal to understand, document and possibly optimize requirements and

then the design. In particular, during the last week of November the Instrumentation GWP performed review of the laser wire system design, requirements and possible alternative techniques of the beam emittance measurements. The Accelerator and Physics Requirements and Integration GWP performed review of the design of the polarimeters. It was found that this particular system require considerable further attention in particular to optimize design for the baseline energy range of 200-500 GeV CM specified by the Parameter document while separating the design changes needed to accommodate optional Z pole running and the 1TeV upgrade, and to solve various design issues for magnets, collimation, signal detections from upstream laser wires, and so on, where part of the issues may have been created just recently, when functionalities of the polarimeter and energy chicane were combined at the end of 2006. Action items and studies needed were identified for five of the GWPs whose integrated efforts are expected to give us possibility, in about two months, to know the directions how we would like to change the design, allowing time for more detailed conceptual design to be developed for the April review.

The BDS group is starting to use EDMS system. We expect that a well designed global architecture of EDMS, with a unified across all the groups system of reporting, approvers, reviewers, etc., will be built into EDMS, allowing unification of the work of all groups and giving effective management tool both for PMs and the technical areas.

References:

[1] Materials of BDS GWP integration, coordination and management meeting, including description of interim technical leadership structure of BDS. November 20, 2007.

ILC EDMS Document D00000000815525

<http://ilc-edmsdirect.desy.de/ilc-edmsdirect/document.jsp?edmsid=D00000000815525>

The summary and action items from the meeting are posted as ILC EDMS Document D00000000815815 (may require EDMS login and BDS group membership).

Appendix

Interim technical leadership structure in Beam Delivery area

- GWP01: Beam Delivery group managing & integration
 - Include TAGL, System Engineer, GWP2-10 leaders, CFS liaison F.Asiri and J.Osborne, System Engineering Office including J.Amann (SLAC) as Technical Area Configuration manager and other functions
- GWP02: ATF2 construction, commissioning & operation
 - T.Tauchi (KEK) leader
- GWP03: Accel. and physics requirements and design integration
 - D.Angal-Kalinin (STFC) leader, SysEngName (SLAC) deputy
- GWP04: Interaction Region and IR integration
 - B.Parker (BNL) leader, T.Markiewicz (SLAC) deputy
- GWP05: Crab cavity system

Beam Delivery System monthly report, November 30, 2007

Andrei Seryi

- P.McIntosh (STFC) leader, L.Bellantoni (FNAL) deputy
- GWP06: BDS Beam Dump system
 - C.Densham (STFC) leader, R.Arnold (SLAC), S.Molloy (SLAC) deputies
- GWP07: BDS Collimation system
 - N.Watson (Birmingham Univ.) leader, N.Mokhov(FNAL), S.Molloy (SLAC) deputies
- GWP08: BDS magnet & PS
 - C.Spencer (SLAC) leader, P.Bellomo (SLAC) deputy
- GWP09: BDS instrumentation
 - P.Burrows (Oxford Univ.) leader, M.Woods (SLAC) deputy
- GWP10: BDS Vacuum system
 - O.Malyshev (STFC) leader, Y.Suetsugu (KEK) deputy

ILC GDE Controls and LLRF PM Progress Report

November, 2007

Electronics Platform and High Availability

Work to develop existing ATCA test stands is continuing.

- ANL has placed an for an for a full 14-slot Sun CT900 ATCA system was placed. Requests for information regarding ATCA purchases was distributed to new regions and labs interested in getting involved with the work packages.
- SLAC has placed a contract with SAIC Corp. for completion of design, fabrication, test of ATCA-VME Adapter module. Units will be delivered with operating software interface to host. Original schematic developed in collaboration with University of Illinois (UIUC).
- Significant progress was made at DESY where IPMI management of a microTCA system was demonstrated using the DOOCS control system.
- Completed *ATCA for Physics* draft document and draft standards collaboration organization, close to ready for distribution to interest groups. This is a Physics Scope Profile, which is a formalization specifying how the accelerator and detector communities plan to make use of the ATCA and SAF specifications.
- SLAC has developed new RF test station klystron interlock system with plan to phase from VME to ATCA platform by 2010.
- After a lengthy repair cycle at Motorola, the Centellis blade server on the FNAL crate was returned from repair and the shelf was brought back on-line.

More on electronics standards:

- Launched design of VME FPGA based fast/slow interlock module.
- Started procurement of water-cooled racks.

Architecture

- Work to understand the application of the SAF (Service Availability Forum) specifications continues. The EPICS PV Gateway was instrumented using OpenClovis3.0 (an open source implementation of SAF).
- The alternative OpenSAF project from Motorola is being evaluated as a possible alternative to OpenClovis.
- A prototype monitoring and management stack is being pieced together using OpenIPMI and OpenHPI. End-user applications Nagios and OpenNMS are being evaluated as possible candidates for large scale control system infrastructure monitoring.

Test Area Updates

- **STF-0.5** started its operation and KEK-llrf team contributed to its stable operation. Digital cPCI llrf system was applied to the SC cavity. Three studies were carried out during STF-0.5 operation. One is feedback performance and others are feedback instability by non-fundamental modes and multi-IF method. The preliminary analysis indicates that the FB stability satisfies

STF requirements of 0.3% (rms) in amplitude and 0.3 deg. (rms) in phase. As for other studies, analysis is under way.

- **FNAL A0 and HTS** – The 3.9GHz HLRF and LLRF system were commissioned at A0. Operation and study of the 5 cell cavity is underway. ESECON based LLRF is now operational for the horizontal test station. MFC modules have been sent out for production as well as additional ESECON boards.

Engineering

- We attended Value Management workshop organized by CFS team and moderated by the OVEST Team from Army Corps of Engineers to observe the process followed and reviewed several standards and guidance available on the topic.
- Evaluated quantitative risk management process guidance and tools.

Project Management

We formulated and revised Controls and LLRF work package titles and descriptions, and made a call for expressions of interest to the ILC community and the accelerator controls community at large. Individual facilities responded to the call with effort and materials estimates and we potentially picked up a few additional collaborating institutions – LANL, IHEP, and INFN. We assembled the work packages with high level milestones determined. There is still a call from within the controls group to have the list critically reviewed and perhaps condensed. A basic WBS for the Controls and LLRF work packages has been prepared, but not yet circulated through the group.

We have commenced discussions with additional facilities for additional help. Discussions are underway with a commercial company Cosylab to conduct network availability and service interface design in support of the work packages. Additionally two SBIR opportunities are being discussed although it may be too late for this fiscal year: 1) Tech-X Corporation are in progress to establish a DOE SBIR proposal regarding research on Service Oriented Architecture for the ILC control system and 2) RPATH to use a virtual machine mechanism as a way of setting up a job execution environment for controls production and development.

Workshops and conferences:

- The [ICALEPCS](#) (International Conference on Accelerator and Large Experimental Physics Control Systems) was attended, and a talk entitled “The ILC Control System” was presented. The GDE meeting at ALCPG at Fermilab was attended, and status reports on the controls work packages were given to the area system groups.
- The [LLRF07](#) (Low Level Radio Frequency Workshop) was attended. Some ilc-related working groups (WG1:Linacs with focus on ILC and XFEL, WG2:Commissioning, Operations, Automation, Testability, and WG4: High reliability/availability considering hardware & software issues) were organized and discussions are made in the world-wide llrf community. Many ilc-related talks and posters were also presented.
- The CCAST ([The China Center of Advanced Science and technology](#)) [ILC Workshop](#) & 1st Asia ILC R&D Seminar were held at IHEP Beijing from 5-7 November 2007. The workshop aimed to review the progress of the ILC Asia regional accelerator related R&D activities in relation with other regions and to promote regional and inter-regional collaboration on ILC. On the Seminar IHEP control group have a talk “ILC Control and IHEP Activity” to introduce the ILC controls and research plan of HA on the ATCA platform.

- Preparing for [XFEL LLRF](#) Review in December
- Preparing for [XFEL electronics standards workshop](#) in December.
- Began planning for ATCA workshops at Sendai GDE meeting in March 2008 and [Dresden IEEE Nuclear Science Symposium](#) in November 2008.

Conventional Facilities and Siting Group
Civil Engineering/Conventional Facilities (CE/CF)
EDR Monthly Report
November, 2007
J. Osborne, V. Kuchler

November 30, 2007

The following progress report describes the efforts of the Civil Engineering/Conventional Facilities Technical group through November 30, 2007, including some accomplishments completed in the prior months. Further, all three regions contributed to the accomplishments listed below:

- EDR kick-off meetings were held in all three regions and representatives of the CE/CF group participated in all Area System and some Technical System EDR kick-off meetings as well.
- An overall Work Breakdown Structure (WBS) for the CE/CF effort was developed that reflected work required for the development of the EDR as well as work that will be required through the actual start of construction.
- Work activities described in the WBS were prioritized and the highest priority items were then developed into CE/CF work packages with suggested milestones and completion dates. These work packages were iterated several times within the group prior to submission to the Project Management Group.
- Once the initial set of work packages were completed, a draft CE/CF Project Management Plan (PMP) with milestones for the highest priority work packages was developed and submitted to the Project Management Group.
- During the Damping Ring EDR kick-off meeting, an initial comprehensive Area System criteria list was developed. This criteria list will be used, with necessary adjustments, to collect data from all of the Area Systems in the coming months and will serve as the basis for the EDR CFS design.
- The first in a series of value management reviews was organized, in conjunction with consultants from the U. S. Army Corps of Engineers, to identify options for value improvement and cost reduction with respect to the ILC Main Linac process cooling water system. The review was held at Fermilab, Nov 27-29, with international participation both in-person and by Webex.
- A review of the CFS cost estimate was initiated at the GDE Meeting held at Fermilab in October, 2007. Additional work was conducted in the weeks that followed. The result is a CFS cost estimate that has been reconciled between the three regions, is consistent with the information contained in the Reference Design Report and adjusted to correct minor discrepancies that had been identified by the Cost and Scheduling Group. An updated version of the CFS cost estimate, including lower level back-up information and dated March 30, 2007, was forwarded to Peter Garbincius. This cost estimate will serve as the basis for all value engineering and alternative investigation pursued in the development of the EDR. Additional adjustments to any cost item, identified after the March 30, 2007 date, will be catalogued and added to the CFS cost estimate at the next update cycle developed in conjunction with the Cost and Scheduling Group.

Anticipated work in the coming months:

- Generate and distribute criteria lists to all Area Systems (tailored as needed for general as well as area specific criteria).
- Establish EDR points-of-contact with all Area Systems and Technical Systems as needed.
- Continue to develop CE/CF plan for EDR definition and completion for presentation at the GDE Meeting in March, 2007 with consideration for available resources and work package assignments.
- The CFS Group will explore with CERN issues common to the ILC and CLIC projects that have strong mutual interest and overlap in the Conventional Facilities area.

Monthly Report (15oct07-15nov07) for monthly_report_19nov07.doc
Project Management Office – Cost and Scheduling (C&S) and International Costing Group (ICG)
reported by Peter H. Garbincius – 19nov07

We participated in all of the EDR Kick-Off Meetings, either in person or by WEBEX, presenting a summary of the RDR cost estimates for most of the Area Systems. Deficiencies (omissions or double-counts) in the RDR cost estimate were noted in the presentations and discussion. These were tabulated for adjustments in future releases of the estimate.

Initial thoughts on change control for the cost estimate were discussed with the Chairman of Engineering Management Group (formerly Change Control Board).

We prepared and executed a discussion with the Executive Committee on possible Business Models for the ILC construction phase. The features, advantages, and disadvantages of centralized funding (CERN-like) and in-kind contribution (ITER-like) models were discussed. International free trade agreements and current national regulations will influence in-kind procurements.

The RDR Cost Estimate was documented through a single master spreadsheet with web links to the back-up materials provided by the AS/GS/TS groups. Password-protected access was provided to the ILC Director, the three Project Managers, and the International Costing Group. The Asian and most of the European lower level details for the Conventional Facilities and Siting group cost estimate were received. The lower level details for the Americas parts of the estimates had already been received.

We obtained licenses for Primavera (version P6). We are (still) evaluating MAC access to an external computing host for Primavera. PC access works fine. The promised date for decision is November 30. We attempted, without success, to secure project management support through Fermilab and Argonne National Laboratory. Vendor proposals for Project Management Consulting are due November 26.

To do over the next month(s):

Finalize contracts for Project Management Consulting and external hosting of Primavera
Define and start implementing Project Management tools, procedures, and training
Propose Change Control Procedures for Estimates – namely thresholds and who reviews
Complete the Business Model for ILC
Drill-down review of the Work Packages and EDR plan report for FALC

Peter

EDR Monthly Report – Cryogenics, SCRF Technology

November 2007

Tom Peterson

Work accomplished.

The engineering design (EDR) phase of ILC began this past fall with a series of “kick-off meetings”. ILC cryogenic system work included summarizing the status of cryogenic system design, essentially the RDR design, for the kickoff meetings. I summarized Main Linac cryogenics at the cryomodule/cryogenics kick-off meeting at KEK, 12 – 14 September 2007 and also presented a draft EDR work list. I also summarized system design status and plans at the ALCPG/GDE meeting on 25 October. Cryogenics work also included providing summaries for BDS and Damping Ring cryogenics at those kick-off meetings (BDS just a written summary, Damping Rings via Webex talk on 6 November), and some e-mail exchanges with ILC source groups about source cryogenics.

In the course of preparing cryogenic system design summaries, some technical content was updated such as inventory estimates based on latest cryomodule pipe sizes and the preparation of a new positron linac lattice layout to show cryogenic box and plant spacing.

The cryogenics group defined a list of tasks, “work packages”, over the past year. This list actually started a year ago as a list of RDR issues which we thought merited more effort but could not be completed during RDR due to lack of resources. This fall, we discussed this work list with various people around the world who might be interested in participating in the cryogenics work for ILC, as well as with ILC managers. On 10 October, I sent out via e-mail a formal request for “expressions of interest” (EOI) for work on ILC cryogenics. Institutions which have at least expressed interest in doing some ILC cryogenic work include the following.

From the Americas: Fermilab, SLAC, TJNL, BNL, Triumf, ANL

From Asia: KEK, India-IUAC, India-RRCAT

From Europe: CERN, DESY, INFN

I should also mention that I represented ILC at the INDO-US Joint School on Cryogenics, Superconductivity, Vacuum, and Low Temperature Measurement Technique at IUAC, New Delhi, India, with a general ILC talk on 19 November.

Work plan.

Resources for ILC cryogenics work will clearly be very limited during the EDR. Institutions, quite logically, want to focus on the high-priority R&D and design issues such as cavity gradient, niobium processing, cryomodule design, beam dynamics, RF power, etc. It appears that ILC cryogenic systems will have about 2 to 3 full time equivalents (FTE) over the next year. (My effort is budgeted at ½ time.) Major contributors presently appear to be Fermilab, KEK, INFN-Milan, and perhaps RRCAT in India (discussions with them still in progress).

DESY and CERN will provide help consistent with their XFEL and LHC priorities. Due to the very similar nature of the cryogenics problems in XFEL and ILC, even just access to XFEL cryo design work will be a significant help. Many nearly identical problems, such as emergency venting, peak pressures, end box design and distribution box designs provide opportunities for collaboration with DESY which are mutually beneficial. We maintain very good communication with DESY; I will attend the TTC meeting at DESY in January. Help will be available from CERN in the form of LHC cryogenics information, but manpower to provide this help will be limited to a small fraction of an FTE.

We are in the process of reviewing our cryogenic systems task list in light of the limited resources which will be available over the coming year. By the end of December we will have assembled a work plan (a reduced work scope) for EDR cryogenics which is consistent with anticipated resources.

Monthly Report for Project Management Office

Damping Rings

November 2007

Part I: General and Organisational

The EDR Kick-Off Meeting at the Cockcroft Institute, Daresbury, UK, 5-7 November, reviewed the configuration developed for the RDR (including technical issues and costs) and discussed the organisational structure being worked out for the engineering design phase.

Presentations from the Kick-Off Meeting are at:

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=1861>

Key points from the meeting, and mentioned in the close-out include:

- The current design appears to meet performance requirements.
- Remaining critical risks to be addressed by the R&D programme are clearly identified and documented.
- The work package structure proposed for the engineering design phase is fundamentally ok, though resource allocations and coordinating institutions require closer review.
- Integration issues need some resolution (for example, how formally to manage the interfaces with global systems such as CF&S).
- We must look at ways to constrain or reduce the costs.

At present, the organisational structure for the damping rings during the engineering design phase includes 15 Work Packages. Some of these Work Packages cover beam dynamics (including: Orbit, Optics and Coupling Correction; and Impedance and Impedance-Driven Instabilities). Other Work Packages cover technical R&D and design (including: Injection/Extraction Systems; Magnets; Vacuum System). There are also some larger Work Packages, such as Electron Cloud, covering a range of different types of activity.

All the Work Packages have nominated Managers; however, the nominations have yet to be approved by the Project Management Office. Through an open invitation to institutions to submit Expressions of Interest for contribution to damping rings studies through the engineering design phase, we have collected reasonably detailed information on the participation and resources for each of the Work Packages. The nominated Work Package Managers are now developing the next level of detail, which includes specification of the deliverables and schedule, and assigning responsibilities. Ensuring consistency in the information flow between Work Packages will be essential for the success of the programme. The goal is to complete a work plan including detailed information on deliverables, schedule and responsibilities by the end of 2007.

A lattice design that is stable through the engineering design phase will be essential for many of the Work Packages to complete the work proposed. Researchers at ANL have been developing the RDR baseline lattice (OCS6) to implement many of the modifications and additional features identified during the RDR studies. A new version (OCS8) will be completed by the end of 2007. At the same time, an alternative (FODO) design has been developed by researchers at IHEP Beijing. A selection of a lattice design that can be “frozen” for the engineering design phase will be made by the end of 2007.

The next Damping Rings R&D Mini-Workshop will be at KEK, 18-20 December 2007:

https://wiki.lepp.cornell.edu/ilc/bin/view/Public/DampingRings/ILCDR07_KEK/WebHome

The workshop will focus on three topics: electron cloud; fast injection/extraction kickers; impedance and impedance-related effects. All those interested are invited to participate.

Part II: Technical

Wiggler (Work Package 3)

Over the course of the last month, work has proceeded on the organization and management of WP3. This has included an evaluation of the scope of the work package, a review of the resources required to provide a reasonably detailed engineering design for the baseline superconducting option for the wiggler, discussions about possible research into alternative designs (in particular, a US DOE SBIR grant proposal has just been submitted by DULY Research Inc.), and an evaluation of the resources available during the EDR period. During November, design work for the baseline design (based on the CESR-c superconducting wigglers) has focused on two key areas. First, a significant effort (LBNL/Cornell) has been devoted to the development of diagnostic wiggler chambers which incorporate electron cloud mitigation methods for testing inside the CESR-c wigglers. The first of these chambers is targeted for installation this coming May with initial beam tests at CESR to take place in June. Secondly, work continues (Cornell) to identify potential optimizations to the baseline design which would reduce construction costs, simplify the fabrication procedures, and/or improve key details in the engineering design. The short term goal of this effort is to provide detailed 3D field information for beam dynamics evaluations after the damping rings baseline lattice is frozen in late December. Subsequently, a final decision on baseline wiggler parameters is targeted for mid-2008.

Instrumentation and Diagnostics (Work Package 4)

Beam instrumentation studies for the ILC damping rings are currently focussed on R&D activities at KEK ATF (high resolution BPM system), and the Cornell CEsrTA storage ring (fast x-ray synchrotron light monitor for single bunch beam profile measurements). The ATF BPM upgrade project is extended to 20 (out of 96) BPMs, utilizing high resolution beam orbit measurements in narrowband mode (with resolution of 200-400 nm), or wideband turn-by-turn mode (with resolution of a few microns). During November a new calibration system, together with an improved analog down-converter front end was developed by the SLAC/Fermilab collaboration. This system will sense slow drift effects in the gain stages and automatically correct them, thus keeping the BPM offset constant. A prototype will be installed, commissioned and tested at the ATF damping ring during December.

Power Systems (Work Package 8)

The ILC needs high availability systems in view of the large quantity of components employed. SLAC is very involved in the development of high availability power systems, and the Power Conversion Department (PCD) is presently developing forty redundant unipolar magnet power supplies for the ATF2 project at KEK. These modular systems are building blocks that offer great promise for several ILC magnet power applications. They can power magnets requiring currents ranging from 5A to 200A, with very stable current regulation. PCD sees them as especially suitable for the distributed bus system envisaged to power most of the Damping Ring magnets. OCEM in Italy is providing the power modules (which are being delivered now), and other system components are SLAC-designed and fabricated. SLAC will test the systems, and delivery and installation into ATF2 will take place in the first quarter of 2008.

The ILC will also need bipolar systems. SLAC PCD is just starting work to develop a high availability bipolar power supply; this will be a modular supply able to accommodate magnet currents from 5A to 125A. PCD is also encouraging an American manufacturer to submit a Small Business Innovation Research (SBIR: <http://www.science.doe.gov/sbir/>) proposal for high availability bipolar power supplies. These will be small printed circuit card units, rated at 15 A, that have an ATCA or microATCA form factor. The SBIR proposal is due by November 27, 2007.

Vacuum System (Work Package 13)

Conceptual designs are being developed at Daresbury for the vacuum chamber cross-section in the arc regions. The aperture will accommodate the injected positron beam size; the design

incorporates an antechamber to reduce the number of photons in the chamber (to help mitigate electron cloud), cooling channels, and heating tape for in-situ bake-out. A “straw-man” design, for consultation with other Work Packages (particularly: Magnets; Impedance; Instrumentation and Diagnostics; Electron Cloud) should be available soon.

Fast Kicker Development (Work Package 14)

KEK-ATF: Development of fast, high power pulsers meeting ILC specifications to drive the injection/extraction kickers are a very high priority R&D item. Two 10 kV pulsers have been received from FID GmbH; a further two 10 kV pulsers have been ordered from the same company. The performance of the 10 kV pulsers does not satisfy the requirements for the ILC damping rings, and modifications have been requested. Two of these pulsers will, however, be used for beam dynamics studies (specifically, studies of nonlinear dynamics) in the ATF damping ring. The specifications for the 10 kV pulsers match the specifications for the pulsers envisaged for the ILC damping rings in most respects; one difference is that, to reduce costs and improve lifetime, the 3 MHz burst period is specified for 0.1 ms rather than 1 ms (as will be required in ILC).

INFN-LNF: Stripline kickers are installed at DAΦNE and, at present, are fed by the old pulsers. Commissioning of the machine with the new configuration to test the “crab waist” collision scheme just started.

SLAC-LLNL: November started with a restructuring of SLAC's ILC budget and a reduction of the DR kicker modulator program, which has been restructured based on the new funding level for FY08. The DSRD program will work to develop a ± 5 kV modulator that will be delivered to KEK under the US-Japan joint research program. The goal parameters for this system are ~ 1 ns rise and fall times, ~ 2 ns flat-top, into $50\ \Omega$. The inductive adder program will attempt to refine the high switching speed circuits demonstrated in FY07 and combine them into parallel arrays capable of 400 A (required for an inductive adder of ± 10 kV into $50\ \Omega$). We have concluded that it is unlikely that conventional inductive adder structures can achieve the < 1 ns rise/fall time required for 3 ns bunch spacing. Therefore, we plan to investigate alternative adder designs.

Fast Ion Instability (Work Package 15)

There are concerns that fast ion instability could limit beam quality in the electron damping ring. Qualitative observations have been made at several operating machines, but the models have not been properly tested. The goal of studies at the ATF is to collect quantitative data over a range of conditions (beam sizes, vacuum level and composition) to benchmark models of fast ion instability. The key requirements for the study are:

- installation of a gas inlet system to allow a controlled “pressure bump” using different gas species in one section of the ring;
- instrumentation and diagnostics (provided by the damping ring laser wire) to determine emittance variation along a train of 20 bunches, as a function of gas pressure and species, nominal emittance, bunch charge etc.;
- achievement of (low-charge) vertical emittance below 5 pm.

A gas inlet system has been installed and tested, to confirm that a pressure bump with pressure (10^{-5} Pa) two orders of magnitude higher than usual. Experiments to collect data on fast ion instability are planned for December. This will involve collaboration between researchers at KEK, DESY and SLAC.

Draft - 2007/11/30

To: GDE PMs
From: Nobu Toge
Subject: Monthly Activity Report – Engineering Management (Nov. 2007)

The following activities have been performed or ongoing.

1. **ILC EDMS Power-User Training** was held at DESY November 26-30, 2007. This one-week training course was organized to teach the necessary skills and background information for becoming an ILC EDMS Power User. It consists of hands-on training sessions, group work for creating sample project documentation, and a few lectures on technical background. URI: http://ilc-edms-put.desy.de/index_eng.html.
2. **EDMS Category Structure:** An initial draft (Excel tables) has been circulated within PMEDR on October 31. This is the beginning toward rebuilding the GDE document system in the framework of ILC-EDMS, and making them more maintainable and more meaningfully traceable with respect to costing, designing and other related critical efforts. More than a few feedback comments have been received, and the Category Structure is currently being redrafted by the EM team. A “Pedestrian’s Guide” (or FAQ) document is also in the works. ETA: the end of 2007.
3. **Consolidation of All Numerical Tables from RDR:** To facilitate cross-examination of numerical statements and preparatory work toward full-fledged system design activities, all the Tables that appeared in RDR have been consolidated into an Excel book. ETA: presently nearly ready for review by PMEDR.
4. **Change Request Form:** A draft of the form to submit with each EDMS change request has been circulated within PMEDR on November 27. Besides feedback from PMEDR members, critical consultation and approval of PMs are required before its finalization and formal use. ETA: the end of 2007 or early January, 2008.

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