



Engineering and Design Kick Off Meeting

Version 1.0

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Technical system: e- Source

Date: 24 September 2007
Location: SLAC
Host: Axel Brachmann, brachman@slac.stanford.edu
Secretary: Marc Ross; mcrec@fnal.gov
Meeting: e- Source Kick Off Meeting

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1 Goals

The goal of the e- Source Kick Off meeting was to examine the RDR design and assess its technical maturity and completeness, evaluate plans for EDR design work including development and incorporation of items presently outside the baseline and begin planning for the Engineering Design Phase. The agenda included presentations on the RDR design, RDR cost estimate, ongoing R & D and plans for EDR work.

2 Kick Off Meeting Organisation

2.1 Agenda

The agenda of the Kick Off Meeting is available from the InDiCo page together with the presentation material.

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=1856>

e- Source Kick-off Meeting – 24, 25 September 2007, SLAC.		
Daily Program: Monday 24 September 2007		
Introduction	09:00-09:30	BRACHMANN, Axel
View from the Project Management Office	09:30-10:00	ROSS, Marc
The RDR Design	10:00-10:45	BRACHMANN, Axel
break	10:45-11:00	
The RDR Cost Estimate	11:00-12:00	BRACHMANN, Axel
RDR-CFS	12:00-12:45	ASIRI, Fred
lunch	12:45-13:45	
Planning the EDR Phase	13:45-14:30	SHEPPARD, John
Lattice Simulations and Spin Transport	14:30-15:15	Zhou, Feng
break	15:15-15:30	
Special Instrumentation	15:30-16:00	BRACHMANN, Axel
R & D Program in Japan	16:00-16:30	YAMAMOTO,
e- Source Kick Off Meeting – 24-25 September 2007, SLAC		
Daily Program: Tuesday, 25 September 2007		
Milestones & Resources in Detail	09:00-09:30	SHEPPARD, John
Polarized RF – Gun – Alternative beyond Baseline	09:30-10:00	KEWISCH, Jorg
Global Work Package Plan	10:00-10:30	ROSS, Marc / MISHRA, Shekhar
Discussion	10:30-11:00	
break	11:00-11:15	

e- source NC RF structures	11:15-11:45	WANG, Juwen
e- Source Laser System	11:45-12:15	BRACHMANN, Axel
Photocathodes for polarized Beams	12:15-12:45	MARUYAMA, Takashi
lunch	12:45-13:45	
Polarized DC Gun	13:45-14:15	POELKER, Matt
Source Issues and SLAC's ITF	14:15-14:45	CLENDENIN, James
Discussion and Wrap-Up	14:45-15:45	

2.2 *Host*

Axel Brachmann at SLAC

2.3 *Attendance*

Gerry Aarons
Fred Asiri
Vinod Bharadwaj
Wilhelm Bialowons
Axel Brachmann
James Clendenin
Jorg Kewisch
Masao Kuriki
Takashi Maruyama
Ewan Paterson
Nan Phinney
Matt Poelker
Marc Ross
John Sheppard
Tonee Smith

Junji Urakawa
Juwen Wang
Akira Yamamoto
Masahiro Yamamoto
Feng Zhou

2.4 Secretary

These notes were taken by Marc Ross, Fermilab.

3 Kick Off Meeting Documentation

The topics of the kick off meeting are displayed below and followed by the conclusion or recommendation. The factual basis is given. The material has been posted with the agenda on the web and will be complemented by this document.

All RDR cost numbers, except those which were at a level high enough to be included in the RDR itself, must be password protected (or have an equivalent access restriction).

3.1 *Topic 1: Assess the technical maturity of the RDR design and the completeness of the value estimate*

3.1.1 Breakdown of CFS costs

Conventional Facilities / Siting (CFS) costs are a large fraction of the e- Source cost. For various reasons these have not been subdivided making an analysis of the e- Source CFS costs difficult.

Recommendation for topic 3.1.1

A cost breakdown, showing the cost of all aspects of the e- Source civil engineering is required in order to allow cost control and cost saving efforts to begin. This is the highest priority e- Source recommendation.

3.1.2 Dump enclosure costs not included

The e- Source includes a set (2?) of beam dumps to be used in tune up and partial machine access modes. The cost of the earthworks for the dump enclosures have not been included in the RDR estimate.

Recommendation for topic 3.1.2

Develop model for dump enclosure costs with CFS group. This is also underway for RTML, where it was also omitted.

3.1.3 Source cryoplant costs

The e- Source cryoplants have been separately developed and costed together with the e+ Source.

Recommendation for topic 3.1.3

The e- Source cryogenic requirements are small compared to those of the nearby main linac. Consider combining the cryoplants in an effort to reduce cryogenic – related costs.

3.1.4 Corrector magnets – Normal Conducting (NC)

It was observed during the review of the e- Source RDR cost estimate that normal conducting corrector magnets were not included. In addition to the cost of the missing elements, it is not clear that enough room has been allocated to these devices

Recommendation for topic 3.1.4

In other areas (notably e+), a relatively high cost has been estimated for these devices, although the combined system cost is low compared to other sub-components of the magnet system. The e- Source group should include this task in their magnet systems Work Package.

3.2 Topic 2: Evaluate plans for EDR design work including development and incorporation of items presently outside the baseline

3.2.1 Inclusion in Work Packages of all related efforts in support of the BCD and on various ACD

The ILC EDR relies on support from institutions and universities around the world. All of these organizations are funded through nominal funding channels, including inter-institutional transactions, but not through the ILC-GDE itself. We must make every effort to include the effort these groups expend on behalf of the ILC in our discussions and planning. There were three e- Source R & D topics in support of the baseline, linked to alternates, that we discussed. The three are 1) the gun high voltage (indeed gun design), 2) the photocathode and 3) the drive laser. (A fourth item, of somewhat different nature, is the development of a normal conducting RF structure - different because it can be linked to ongoing work for e+). The draft work package allocation presented by the e- Source group (posted) does not appear to have been developed through a 'polling process' as is underway in other Accelerator Area Systems Groups and may therefore have excluded ongoing work.

Recommendation for topic 3.2.1

Two specific steps are recommended: 1) make sure that the community knows what is under development and has an opportunity to contribute and 2) specifically distribute, if possible, Work Package coordination in order to ensure that the effort is not led by a single region or institution, especially for laser and photocathode. Try to make sure that teams working on these general issues have visibility and opportunity.

3.2.2 Development and implementation of a clear policy involving R & D and design effort contributions

The responsibility of the Technical Area Group Leader is a global one. If any capable group wishes to contribute to baseline R&D and has their own funding then the group must be included in the Work Package definition.

Recommendation for topic 3.2.2

The Technical Area Group Leader must present the process used to determine who is listed in the Work Package definitions for review by Project Managers.

The Project Managers will devise and distribute guidance on how this should be done.

3.2.3 EDR teleconference meeting schedule

The EDR Kick Off meetings mark the beginning of the ED phase activity. Following the Kick Off meeting, we expect to institute a set of regular teleconference meetings that maintain and strengthen the links established during the Kick Off meetings and allow follow – up of action items and Work Package efforts.

Recommendation for topic 3.2.3

The Project Managers and Technical Area Group Leaders will develop this schedule. The nearest deliverable, defining and reviewing the Work Packages, will begin in earnest before and at the Fermilab GDE meeting and a meeting schedule will be developed to support that effort.

3.2.4 Definition of allowable CAD tools and associated design controls

The EDR Project should define recommended CAD tools in order to promote the use of full CAD modeling.

Recommendation for topic 3.2.4

The EDR Project Manager Office will indicate recommended CAD tools and solicit feedback on associated issues of compatibility etc.

3.2.5 Assignment of responsibility for installation costs

Assignment of responsibility for installation costs has not been clearly made.

Recommendation for topic 3.2.5

Installation efforts associated with a given Accelerator Area Systems should be handled by that group, as are other Area-specific activities. Coordination of installation efforts between different Accelerator Areas will be the responsibility of a Global installation coordination group, yet to be organized.

3.2.6 CFS / e- EDR interface – who is responsible for what

The interface with CFS is quite important because of the expected cost savings that will result from an optimized design. The EDR project Accelerator Area Systems Groups will have to have a workable interface in order to promote this process.

Recommendation for topic 3.2.6

The interface between the Accelerator Area Systems Group and the CFS effort will depend on the staffing levels, expertise and the connections between the two groups. The two groups should work to define this interface and develop draft work packages accordingly.

3.2.7 Size of the EDR

All groups assigned to develop EDR sections should include, in their planning, the effort associated with the final phases of the EDR project ([http://ilcagenda.linearcollider.org/getFile.py/access?contribId=1&resId=0&materialId=slides&confId=1856#273,13,Top-Level EDR Project Schedule](http://ilcagenda.linearcollider.org/getFile.py/access?contribId=1&resId=0&materialId=slides&confId=1856#273,13,Top-Level%20EDR%20Project%20Schedule)). In order to plan this effort, the groups should understand the level of effort to be required.

Recommendation for topic 3.2.7

The Project Managers and the GDE EC should estimate the size and scope of the EDR document and prepare an outline to distribute for guidance on this topic.

3.2.8 Development of options (e- e-, gamma gamma)

In addition to Baseline and Alternates development, many groups, especially in Accelerator Systems, expect to be responsible for Options (e.g. e-e- and gamma gamma) development and inclusion in the EDR.

Recommendation for topic 3.2.8

The Project Managers and the GDE EC should develop guidance to be used in these cases.

3.3 Topic 3: Examine proposed Work Packages and comment on how they support the EDR goals.

3.3.1 Definition of Gun baseline and justification of HV RD

During the e- Source Kick Off Meeting, R &D efforts aimed at increasing gun DC high voltage were presented by the Nagoya University group (Masahiro Yamamoto) and the Jefferson Lab Group (Matt Poelker). During discussion, it was not clear what the group's strategy was with respect to baseline definition and R & D goals. It is possible that the gun high voltage is an important parameter in limiting losses and thereby reducing specified intensity margin.

Recommendation for topic 3.3.1

The e- Source Group Leader should specify, as part of the Work Package definition that refers to these efforts, the goal and impact higher gun high voltage would have.

3.3.2 Aperture margin

For both the e- and e+ Source Systems, the needed aperture is a key parameter. The RDR has equal aperture for both systems, perhaps leading to excessive system cost.

Recommendation for topic 3.3.2

The e- Source Accelerator Area Systems Group should develop and define an appropriate aperture margin that minimizes both technical risk and total cost. Since a common design for the e+ and e- system was accounted in the RDR, any deviation from that would have to be evaluated.

3.3.3 Photocathode R & D

The photocathode R & D presentation indicated that the performance of this technology with Baseline parameters is not assured and may be a serious challenge. (See <http://ilcagenda.linearcollider.org/getFile.py/access?contribId=17&resId=0&materialId=slides&confId=1856#273,6>, ILC Train Extraction and preceding slides). The RDR acknowledges this, tacitly, “With bunch spacing of 300 ns, the surface-charge-limit problem for the ILC is not expected to be a major issue.” (RDR Volume 3 2.2.3.1). This was presented as a high priority R & D goal.

Recommendation for topic 3.3.3

The e- Source Group Leader should work with the Project Managers to make sure that a suitable demonstration is properly funded and planned.

3.3.4 Vacuum R & D

It is known that gun vacuum has a significant impact on photocathode lifetime. Several groups are working on various aspects of this challenging technology, including Jefferson Lab and Nagoya University.

Recommendation for topic 3.3.4

Development of instrumentation, baking and pumping strategies is and will remain an important part of gun design. The e- Source group should define goals and understand the impact this R & D will have on gun operation.

4 Action List

Action list as derived from the recommendations

Reference	Responsible	Identifier	Action
Topic 3.1.1 (CFS Cost Breakdown)	AS Group Leader	ILC-ED-ES-01	Draft and plan the e- Source CFS Work Package with the explicit inclusion of this goal.
Topic 3.1.2 (Dump CFS cost)	AS Group Leader	ILC-ED-ES-02	Draft and plan the e- Source CFS Work Package with the explicit inclusion of this goal.
Topic 3.1.3 (Source Cryoplant)	AS Group Leader	ILC-ED-ES-03	Draft and plan the e- Source cryogenic systems Work Package including this analysis.
Topic 3.1.4 (NC correctors)	AS Group Leader	ILC-ED-ES-04	Draft and plan the e- Source magnet systems Work Package including normal conducting correction magnets
Topic 3.2.1 (Effort to invite participation)	AS Group Leader	ILC-ED-ES-05	Solicit, compile and evaluate expressions of interest for work on e- Source R & D and design
Topic 3.2.2 (Contribution Policy)	Project Manager Office	ILC-ED-ES-06	Devise and distribute guidance policy on including effort contributions
Topic 3.2.3 (Telecon Schedule)	Project Manager Office	ILC-ED-ES-07	Develop and distribute the PM and Group Leader meeting schedule
Topic 3.2.4	Project Manager Office	ILC-ED-ES-08	CAD tool recommendation
Topic 3.2.5 (Installation)	AS Group Leader	ILC-ED-ES-09	Develop installation EDR Work Package
Topic 3.2.6 (CFS Work Package)	AS Group Leader	ILC-ED-ES-010	Define the CFS Work Package to best use both groups expertise and connections
Topic 3.2.7 (Size of EDR)	Project Manager Office	ILC-ED-ES-011	Define and distribute guidance concerning the expected size of the EDR
Topic 3.2.8	Project Manager	ILC-ED-	Devise and distribute guidance concerning the

(Options)	Office	ES-012	development of the options
Topic 3.3.1 (Gun HV)	AS Group Leader	ILC-ED- ES-013	Gun Work Package should define the baseline HV and development R & D
Topic 3.3.2 (aperture)	AS Group Leader	ILC-ED- ES-014	Beamline design Work Package should include aperture 'value engineering'
Topic 3.3.3 (photocathode)	AS Group Leader	ILC-ED- ES-015	Photocathode R & D Work Package should include and support demonstration
Topic 3.3.4 (vacuum)	AS Group Leader	ILC-ED- ES-016	Gun Work Package should define the baseline vacuum and development R & D

5 Summary of Meeting

[The Action List above does not specify individual's names. Further, there are only two 'Responsible Parties' listed, the e- Source Accelerator Systems Technical Area Group Leader and the Project Management Office. For the purpose of this report, these are Axel Brachmann and Marc Ross, respectively.)]