AD & I Meeting – 11 March, 2011

ALCPG11 parallel sessions we would like to:

- **Review and discuss ongoing R&D to understand how it is to be included in the TDR. Special focus should be given to those changes which could substantially impact system interfaces and/or project cost.**
- **Evaluate the potential of R&D on alternates and upgrades to be carried out after the TD phase. This fits well with the emphasis on the 1 TeV upgrade and cost containment.**
- **Develop a schedule for the next 12 months that leads to the start of the actual writing and editing of the TDR and allows the collection of key supporting documents.**

ALCPG Parallel sessions

1) review plans for the ALCPG11 parallel sessions. WG Conveners: Please prepare a 5 minute summary for the meeting:

WG1 – Sources:	Wei Gai, Tsunehiko Omori
WG2 – Damping Ring:	Susanna Guiducci, Mark Palmer, Junji Urakawa
WG3 – Main Linac/SCRF:	Hitoshi Hayano, Chris Nantista, Carlo Pagani
WG4 – BDS:	Andrei Seryi, Hitoshi Yamamoto
WG5 – CFS:	Vic Kuchler, John Osborne, Atsushi Enomoto
WG6 – Beam Dynamics / AP:	Kiyoshi Kubo, Nikolay Solyak, Daniel Schulte

TDR will have:

- **Description of the design, including siting**
- **Updates / choices made on the basis of R&D**
- **Cost estimate, including industrialization**
- **1 TeV upgrade**
- ***Explanation of EDMS repository***

- **Implementation Plan / Governance scheme**

- **Outline to be discussed ALCPG11**

Description of the design, *including siting*

- **RDR civil cost estimate based on average of input from each region**
  - Separated 'site dependent' and 'component' costs
- "1.83 Billion (ILC Units) for site-dependent costs, such as the costs for tunneling in a specific region." (6.2.1)
  - This separation was clear for uniform siting → will be different for TDR
  - Utility cost estimation effort split → also different
- "A more complete study of a shallow site –either a shallow tunnel or a cut-and-cover site – will be made in the future as part of the Engineering and Design phase." (4.1)
  - Now to also include mountainous region configuration

Updates / choices made on the basis of R&D

- **Use R & D Plan to guide 'down-selection' process or 'plug-compatible' interface definition process**

http://ilc-edmsdirect.desy.de/ilc-edmsdirect/document.jsp?edmsid=*813385

"Results from critical R&D programmes and test facilities, which either demonstrate or support the choice of key parameters in the machine design."

- **Evaluation of progress made v/v RD Plan milestones**

Cost estimate, including industrialization

- **(RDR 3.7.4): Cavities ~ 40% CM, in turn 30% of total → 12% of the total**
  - To be cross-checked; too high….
- **SB2009:**

TLCC (% of RDR)	KCS	DRFS
1 Single tunnel	2	1.5
2 Gradient spread	1.5	1.5
3 reduced beam	6	8.4
4 positron	0	0
TOTAL TLCC	**6.5**	**8.4**
Central Complex	1.6	1.6
Oxford TOTAL	12.3	12.6

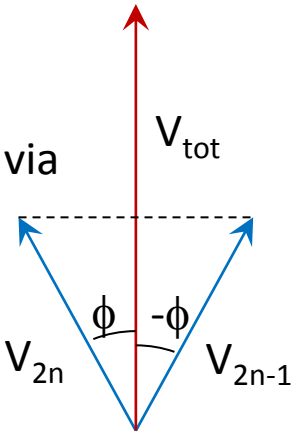
Klystrons Needed per 27 Unit KCS (1/2 bunches)

Scaling from the full current case, we need (0.69×284.2=) 196.1 MW worth of klystron power. At 10 MW each, 20 klystrons would give us 200 MW (2.0% to spare).

However, we want to be robust against a single klystron failure per system. With N sources combined in a passive network, failure of one source leaves combined the equivalent of $(N-1)^2/N$ sources.

With 22 klystrons and 21 on, we have 200.5 MW available (2.2% to spare).

However, we also need 7% (5% usable) overhead for LLRF to be harnessed via phase control of the rf drives, oppositely dephased in pairs, such that the combined power is reduced as $P = P_{max} \cos^2 \phi$, with ϕ nominally 15˚.



The maximum power requirement rises to 196.1 MW ÷ 0.933 = 210.2 MW,

With **23 klystrons** and one off, we have 210.4 MW (0.12% to spare).

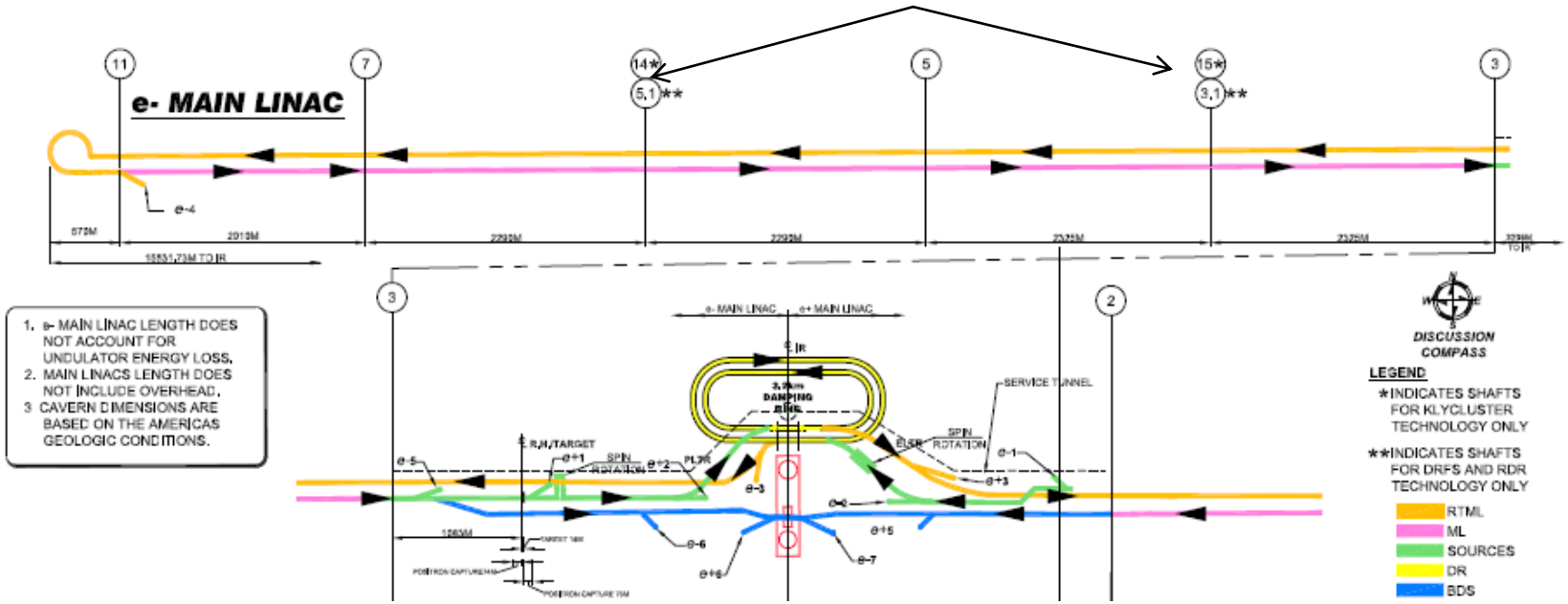
(~~21 klystrons~~ for the 24 unit KCS and
18 klystrons for the 20 unit KCS)

TOTAL: 20×23 + 21 + 18 = 499 klystrons installed (477 on)

30.2% reduced from full current

Layout

Requires Addition of Two 3 m Diameter Shafts per Linac



# of KCS per main linac	9
# of rf units per system	32
# of cryomodules per system	96
# of cavities per system	832
# of klystrons/modulators per system	19 (36)
peak rf power per system (MW)	170 (340)

1 TeV upgrade

"While the focus of the CFS design work has been on the 31 km long 500 GeV machine, the sites are required to support the footprint of the 1 TeV upgrade, both in terms of space and available infrastructure (e.g. power)." (RDR 4.1)

- **One TeV upgrade will be a focus topic.**
  - two plenary sessions (Sunday + Monday)
- **Group to be formed (Nick) to document issues**
  - timeline?
  - resources?

TDR Preparation Baseline Technical Reviews

- **Dates and venues:**

Baseline Technical Reviews		
Area / Group	When	Where
DR	7-8 July, 2011	INFN
RTML	24-25 Aug 2011	Fermilab
BDS	Fall 2011	DESY
Sources	Fall 2011	SLAC or ANL
SCRF / Main linac integration	Winter 2011 / 2012	KEK
CFS	Winter 2011 / 2012	Fermilab

- **Physics and Detector to be represented**

TDR Prep Review Meeting Goals:

- **Review the *TDP R & D* and summarize progress and plans.**
- **Review the *system design***
  - **including a change control procedure so that key design changes can be discussed openly**
  - **The updated baseline will be used for the TDR plan and cost estimate.**
- **Review the *system cost***
  - **For SCRF and CFS, additional meetings, parallel sessions etc are also required.**
- **Review *system interface criteria*;**
  - **for example, requirements to CFS**
- **Review *supporting documents* for inclusion in the EDMS**

- **Discuss TDR preparation plans.**
  - **Upon the completion of the review, we should be able to publish a plan for producing that part of the TDR; resources, milestones, etc**
- **The review to be accessible to the community**

TDR Preparation Review Meeting Scheme

- **each meeting to include document discussion and sign-off**
  - **drawings, specifications and spreadsheets with parameters and costs**
  - **relatively small, compared to BAW**
  - **each key participant can understand their immediate tasks and responsibilities.**

- **the meeting to also include more general summary wrap-up talks, as needed.**

TDR Preparation Review Meeting Scheme (2)

- **meet with TAG's, group by group.**
- **5 to 6 meetings in the next 12 to 15 months.**
- **start with the Accelerator Systems –**
  - Source
  - DR
  - BDS
- **Work on the AS systems:**
  - scope is understood,
  - but there will be questions and changes
- **remaining resources are directed toward completion of specific tests –**
  - CesrTA, ATF2 and source technology development.

Schedule constraints and concerns:

- Each review should last two days
- Comprehensive costing for only SCRF and CFS TAG's
- SCRF industrialization study to be launched this month; expected ~ 1 year
- CFS contracts and HLRF (DRFS) costing work is expected to be ready in late 2011.

- Limit the total number of reviews to six, to take place between mid 2011 and early 2012.
- Try to achieve regional balance and etc

TDR Preparation Review Meeting Scheme - participation

- **CFS representatives to participate in every one of the AS meetings.**
- **costing engineers also.**
- **(SCRF group leaders are not required to participate)**
- **Physics and Detector representatives required for MDI-related meetings; welcome at others**
- **SCRF and CFS meetings toward the end of 2011 or in early 2012**
  - consistent with our schedule
- **reasonable and necessary set of meetings. required to close-out the TDP.**

Topics for System Design Review

- **Review the *TDP R & D* and summarize progress and plans.**
- **Review the *system design***
  - **including a change control procedure so that key design changes can be discussed openly**

Example topics:

1. **Cavity pairing – Power Distribution System.**
2. **Marx modulator**
3. **RDR HLRF fallback**
4. **RTML RF design and civil design.**
5. **Tunnel diameters**
6. **Power dissipation in the tunnel**
7. **DRFS components**
8. **Optimization of Positron production parameters:**
   1. undulator length and field;
   2. polarization collimator space