

## Summary of the ILC AD&I Meeting

1 February 2012

Agenda and slides:

<http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=5509>

### Parameters update –Nick

- New top-level parameters have just been released in EDMS (D\*925325)
- Available at <http://www.linearcollider.org/GDE/technical-design-documentation>
- Consolidated time structure for beam pulse (now only one).
- Adjusted no TF luminosity to include waist adjustment. TF considered not feasible at this time, but difference at 500 GeV is only now ~10%.
- Lower Ecm seem to have issues (~20% effects) which are not understood and will be checked.
- J. List: commented on 20% e+ polarization for 1 TeV parameters – 30% currently being assumed for detector studies. NW: these are the results of the calculations by the e+ group, and represent the first calculated number. Suggested to discuss ramifications at Taiwan workshop.

### Summary of decisions from the recent KEK BTR (Akira)

- Stay with 9-8Q-9 cryomodule configuration (as in RDR)
- Marx modulator to be assumed
- Kamaboko solution with RDR-like HLRF, 1 MBK driving 39 cavities (26 for power upgrade).
- Flat site KCS with CTOs driving RDR-like power distribution (26 cavities).
- Retain RDR 5 cryo-unit division per linac.
- Cavity package plug compatibility envelope
- Cavity package to assume centrally mounted blade tuner
- Tunnel Extension to keep energy overhead up to 1.4% in energy, in addition to the 3% already in cavity gradient design.

Homework for Korea meeting (see slides for details)

- HLRF: cost savings of PDS, klystron, Marx,...
- CM/cryo: CM slot length
  - Accessibility and maintenance of active components
  - Cryomodule unit length
- Cavity integration
- Cavity gradient – update fabrication process and recipe. Redefine the definition of production yield for TDR cost model.

## **Tom Peterson (cryo layout status)**

- Updates reflect recent exchanges and latest ML decisions
- CM slot length of 12.65m (bit needs to be finalized, see below) assumed, rf unit length of 37.956m
- There are several different values for the CM slot unit length and we need to pick one to be used everywhere for TDR:
  - RDR: 12652mm
  - Interim Report (Table 2.5): 12679.6mm
  - Type 4 CAD model: 12634mm
- Tom proposed to pick a unit based on the type-4 CM that is being built – Tom will follow up with Fermilab engineer.
- Cryo plant layout for RDR had assumed 120 RDR RF units per single cryo unit
- There would be a different arrangement for KCS based on info from Nantista
- Tom selected locations for Cryo plants based on new KCS layout from Nantista. This layout requires 6 cryo plants per linac instead of 5 per linac because the last unit has been moved in from the end of the linac. No major impact on Cryo costs, but does change location of end shafts.
  - Can accommodate anything up to 2x 65 CMs per cryo plant
- We need to converge on a single ML layout for TDR
- Note: 'RF units' refer to a group of three CMs per the RDR (not the Kamaboko baseline of 4.5 CMs per klystron)
- Tom needs to know:
  - What constraints are there on grouping RF units aside from Cryo?
  - What is the division of RF units amongst the shafts?
  - Will we have two different layouts for the two ML configurations?
- Nick: we should work very hard to look for one cryo layout for both Kamaboko and KCS configurations
- Nick: who needs to be involved in finalizing the ML layout? Tom: Nantista, Adolphsen, Benno, Vic, Fukuda (Akira and Marc).
- Nick: what about a cryo layout for the mountain site layout? Tom: we could comment on the limits for the cryo layout once we know the other constraints, e.g. shaft spacings.
- Ewan: best approach to design idealized layout for the TDR, and note possible site-constraint impacts (such as mountain site). Akira: OK to stay with the RDR layout for the mountain site for now.

## **Summary of installed modules for ML, RTML, Sources (Nick)**

Numbers of installed modules for all the accelerator sections are being collected together into document in EDMS #972665 (to be released in the next week).

RTML: have increased the number of RDR units by one from the RDR config – from 15 to 16 units as a way of reducing operational gradient so we can run all cavities at the same gradient – cannot tolerate gradient spread when running off-crest (per Adolphsen)

Document is not intended to contain the definitive numbers of klystrons and rf groupings. There is a separate action item to produce a separate document for that.

### **Design Register Status document (Benno)**

The Design Register Status document in EDMS (ID 959505) has been generated to:

- Summarize progress in gathering detailed design information for the accelerator areas lattices and other information for all the beamlines
- This document is available only within EDMS (not on public site). Need an EDMS account to access it.
- It is a working tool for the PMs and the Area Group Leaders
- The DR is updated as often as possible to reflect the current status. Please check it regularly
- A new section in the document shows the state of the mandatory documentation in each of the various systems
- The document is linked from the Technical Design Documentation tab of the Global Design Effort page in [linearcollider.org](http://linearcollider.org)

Benno will start sending email notice to AD&I mailing list whenever there are updates to the document

The table of Mandatory documentation shows that System Overviews are missing for all the systems. Nick: people should ignore this for the time being. Ultimately it will be essentially the first couple of pages in the respective chapters of the TDR.

### **Global Timing (updated numbers)**

- A constraint for defining the timing is that each positron bunch that is created by an electron bunch should fill exactly the bucket in the Damping Ring that is vacated by the colliding positron bunch
- There have been some changes in path lengths since last AD&I report in Oct
  - Tunnel had been 245.4m round trip, which was too short to meet the timing criteria
  - Several adjustments to the tunnel lengths since then (listed on slide)
  - New total length round-trip length for the machine is 29.596km compared with 28.803km previously. This is now too long by 448m, meaning that the positron bunch compressors + linac + BDS length needs to be shortened by 224m to meet the timing criteria, but we are

converging as the accuracy of estimate improves. We still await final details.

- The RTML awaits final lattice design which can only happen after ML length is fixed (accurate to 10m)
- The Positron source lattice for new geometry is not yet final (accurate to 10m)

Nick: our policy is to document in the TDR any discrepancies in the lengths needed to meet timing criteria (rather than trying to adjust exactly). In the end the actual numbers will be very dependent on the site, and there are several options to achieving the timing constraint, but they are now beyond the scope of what we can do for the TDR.

### **Upcoming AD&I meetings**

#### Priorities

- There are three meetings before CFS BTR on 22-23 March at CERN. We need to use these three meetings to prepare the formal documentation for that CFS BTR, with the particular priority on putting together all parameters etc required for CFS
- Also need to begin to we also need to start to work systematically through the Technical Systems (magnets and ps, vacuum, instrumentation etc), specifically we need to decide how we want to incorporate Technical Systems into the Technical Design Report.
- The AD&I meetings will also be used to address TDR writing related topics

Next meeting: 15<sup>th</sup> February