

## Minutes of Meeting #5

Valencia, Wednesday, 8 November, 9 AM

*Present: Eckhard Elsen, Jie Gao, Susanna Guiducci, Tom Mattison, Mark Palmer, Junji Urakawa, Andy Wolski, Mike Zisman.*

**Note:** We had hoped to be able to provide telephone connection for those not in Valencia to join the meeting remotely. Unfortunately, because of general organizational difficulties, this was not possible, and the Chair apologizes to the members of S3 affected.

### 1. “Template” for damping rings R&D plan.

A template (attached) for the damping rings research and development plan was discussed. It was agreed that the template as proposed provides suitable guidance for the development plan, but the following points should be noted:

- In some cases, it may be appropriate to name a coordinator for individual R&D objectives, especially if a significant number of investigators are involved. Whether a coordinator is needed for a given objective can be decided on a case-by-case basis.
- Stating the “consequences” of the R&D not being carried out, or the objective not being achieved, conveys a negative impression. Generally, it will be better to formulate a more positive statement emphasising the need for the research, or the benefits of the objectives being achieved.
- There should be clear, explicit statements of the hardware and/or facilities needed for the research.
- In some cases, it may be useful to give more detailed break-downs of the resources available and the resources needed. For example, the resources available could be broken down by region; and those needed could be broken down according to the type of activity (i.e. theoretical, simulation, experimental...)

The overall aim is to move from a “bottom up” approach to the R&D, in which individual activities are proposed independently by different institutions, to more of a “top down” approach, which would entail more coordination of R&D proposals and activities by the RDB. It is hoped that such a shift in approach can be achieved adiabatically, with the R&D planning process providing one mechanism for the change.

One natural result of the preparation of the R&D plan should be the identification and resolution of duplications of effort. This should be achieved by negotiation between those involved, supported by the RDB and members of S3.

It is envisaged that separate Work Packages within the damping rings R&D plan should correspond loosely to level 3 categories within the damping rings R&D WBS. However, there is flexibility in this, and in some cases it may be

appropriate to combine different categories within a Work Package, or divide a category between different Work Packages.

Responsibilities for preparing Work Packages in the Damping Rings R&D Plan should follow the assignment of “specialisms” within S3. The first Work Packages to be addressed should be those including Very High Priority R&D items. These will include:

- Lattice Design: Mike Zisman
- Low Emittance Tuning: Mike Zisman
- Single-Bunch Impedance: Marco Venturini
- Electron Cloud: Mauro Pivi
- Ion Effects: Marco Venturini/Mauro Pivi
- Injection/Extraction Kickers: Tom Mattison

**We should aim to have the first drafts of the first Work Packages completed by the MAC review at Daresbury, 10-12 January.**

**Action:** Mike, Marco, Mauro and Tom to prepare drafts of R&D Plan Work Packages on topics as given in the above list. Initial outlines should be prepared for discussion at future S3 WebEx meetings in November and December. Drafts should be ready by the ILC MAC meeting, 10-12 January.

In S3 meetings before the end of 2006, we should review progress with the drafts of the various Work Packages.

Once the R&D plan is assembled, it can be reviewed on a schedule corresponding to the funding cycles in the various regions. Reviews may include revisions of structure and resource categories; for example, “students” should be added as a category of effort, alongside scientific, technical and engineering effort.

## **2. Dates of future meetings.**

Future meetings (by WebEx) are proposed for:

Wednesday, 22 November

Wednesday, 6 December

Wednesday, 20 December

**Action:** Andy to confirm and arrange WebEx meetings on the above schedule.

## Work Package 2.1.4: Low-Emittance Tuning

Work Package Coordinator: Mike Zisman

### Investigators:

Yunhai Cai (SLAC)  
 Louis Emery (ANL)  
 Richard Helms (Cornell)  
 James Jones (CCLRC-ASTeC)  
 Mark Palmer (Cornell)  
 Gregg Penn (LBNL)  
 Ina Reichel (LBNL)  
 Vadim Sajaev (ANL)  
 Maury Tigner (Cornell)  
 Marco Venturini (LBNL)  
 Andy Wolski (Liverpool/CI)  
 Aimin Xiao (ANL)  
 Mike Zisman (LBNL)

### Approved/Proposed Resources Summary:

	Approved			Proposed		
	FTE	M&S	Travel	FTE	M&S	Travel
2006	0.25	0	\$3k	-	-	-
2007	0	0	0	2.60	\$5k	\$14k
2008	0	0	0	2.10	0	\$6k
2009	0	0	0	1.60	0	\$6k

#### Objective 2.1.4.1:

#### Develop strategies for low-emittance tuning. (High Priority)

Various techniques are in use to correct the sources of vertical emittance in storage rings; for example, orbit and dispersion coupling, followed by tuning of skew quadrupoles to minimize the vertical orbit change to horizontal steering. Such techniques have been used at the ATF to achieve a vertical emittance of 4.5 pm [1]. Orbit response matrix analysis has been used at the ALS [2] and at the ATF [3] with some success. However, none of the techniques so far tried has proven successful in achieving a vertical emittance of the ILC goal of 2 pm.

Achieving the objective of producing effective strategies for low-emittance tuning will involve the following tasks:

1. Performing studies to understand the limitations of existing techniques, and recommending improvements or optimizations.
2. Devising new tuning techniques.
3. Performing a thorough and systematic comparison of a range of low-emittance techniques, based on simulations on existing rings (e.g. the ATF and the ALS) and on the lattices for the ILC damping rings.

Investigators on these tasks will be:

Yunhai Cai (SLAC)  
Richard Helms (Cornell)  
James Jones (CCLRC-ASTeC)  
Ina Reichel (LBNL)  
Aimin Xiao (ANL)

A total effort of 1.0 FTE per year for two years will be required. Work is mainly simulation.

Work on these tasks should start immediately. The goal is to complete all three tasks by the end of 2008.

The required input includes:

- Data from previous low-emittance tuning studies (theoretical and experimental) at the ATF and the ALS.
- Lattice design for the ILC damping rings.

The deliverables will include:

- Recommended low-emittance tuning strategy or strategies, that are well-understood, and that can be tested experimentally (Objective 2.1.4.3).
- Guidance for further studies leading to specification of the alignment and stabilization requirements (Objective 2.1.4.2) and for the orbit and coupling correction scheme (Objective 2.1.4.5).

If the objective is not achieved, the performance of the damping rings will be more likely to be hampered by difficulties in generating the specified emittance. This will have a direct impact on the luminosity of the ILC.

#### **Objective 2.1.4.2:**

**Specify requirements for survey, alignment and stabilization. (High Priority)**

- Brief description of present status: why is the R&D needed?
- What *specific* tasks must be completed for the objective to be achieved?
- Who are the investigators? (Names, please!)
- What resources are required? (FTE, M&S, facilities...)
- When should work begin?
- When are the deadlines for completion of the various tasks?
- What input is required? (e.g. deliverables from previous objectives...)
- What are the deliverables? (e.g. input for later objectives; or demonstrated technical capability.)
- What are the consequences if the objective is not achieved?

#### **Objective 2.1.4.3:**

**Demonstrate  $< 2$  pm vertical emittance. (Very High Priority)**

#### **Objective 2.1.4.4:**

**Specify support schemes for damping rings magnets. (High Priority)**

#### **Objective 2.1.4.5:**

**Specify orbit and coupling correction scheme. (High Priority)**