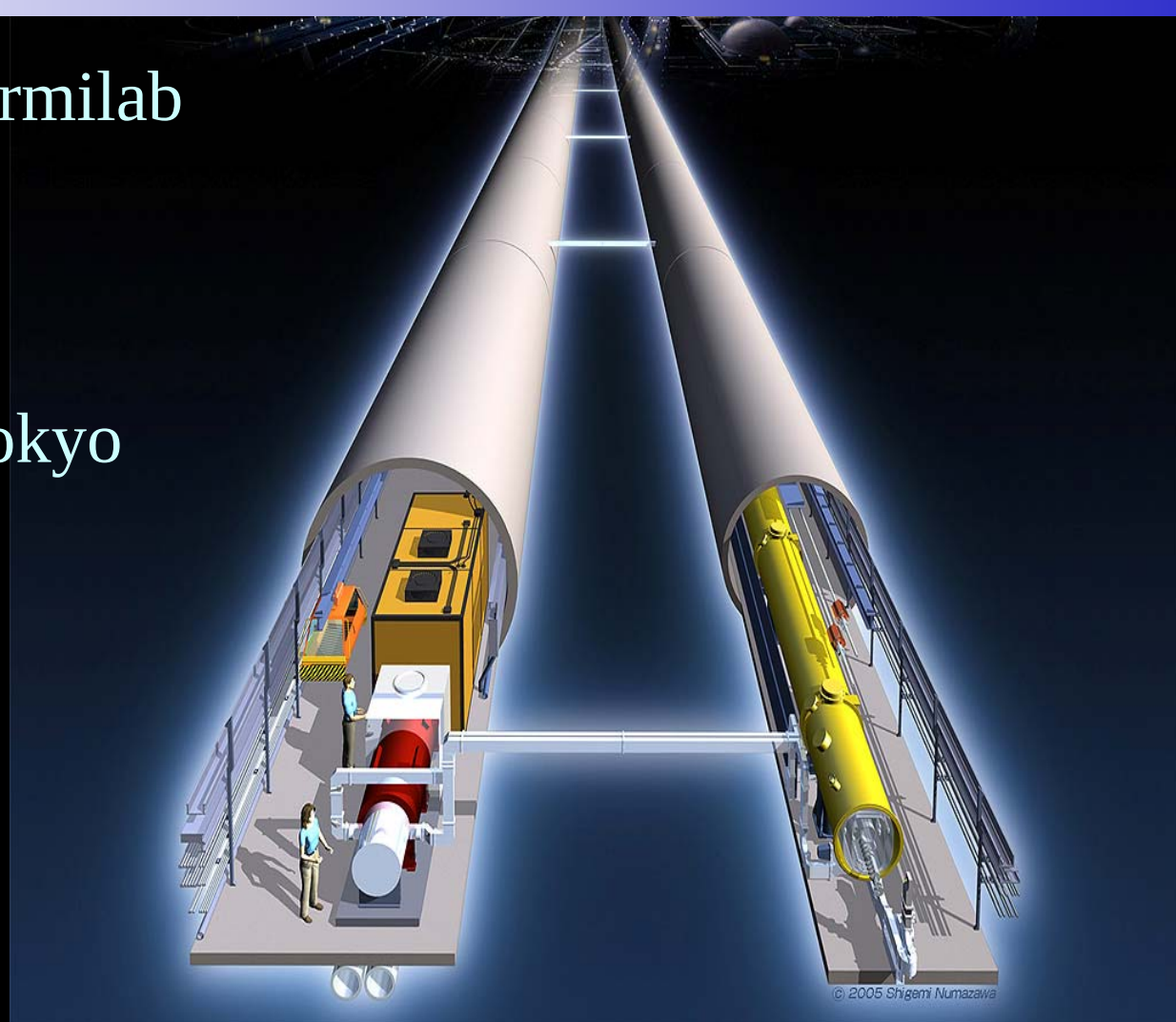
Optimization WG Status and Plan

ILD Meeting @ Fermilab
Oct 23rd, 2007

Tamaki Yoshioka
ICEPP, Univ. of Tokyo



Introduction

• The International Linear Collider Steering Committee (ILCSC) announced a call for Letters of Intent (LOIs) to produce reference designs for the two ILC detectors.

- The LOIs should be sent to the ILCSC by October 1, 2008.
- The LOIs will be reviewed by an advisory body appointed with the approval of ILCSC.

• In order to meet the challenge, people so far working on the detector concepts GLD and LDC have decided to join their efforts to write a single common LoI.

- First joint concept study meeting was held at LCWS07.
- The 6-member joint steering group was elected.

Introduction (Cont'd)

- The steering group identified the following areas that need intense joint efforts and elected corresponding working group leaders:
  - Detector Optimization
    - Mark Thomson
    - Tamaki Yoshioka
  - MDI/Integration
    - Karsten Buesser
    - Toshiaki Tauchi

- The steering group has also decided on the following:
  - The name of the new concept study: ILD.
  - web site: www.ilcild.org

WG Charge and Timeline

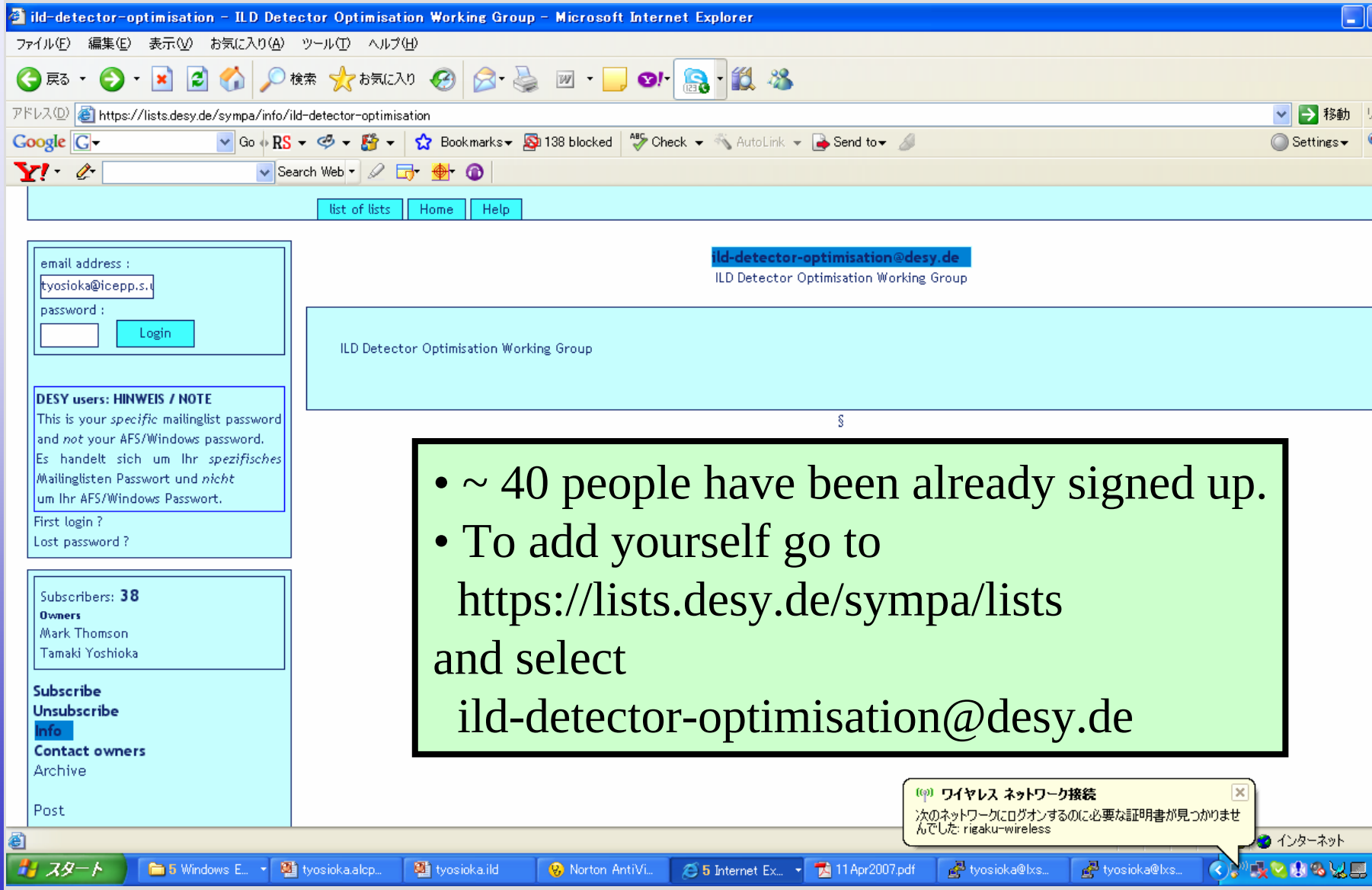
- The charge of the WG is to:

  - Investigate the dependence of the physics performance of the ILD detector on basic parameters such as TPC radius and B-field. On the basis of these studies and the understanding of any differences observed the WG will make recommendations for the optimal choice of parameters for the ILD detector.

- Timeline:

  - The WG should aim to have result from detector optimization studies by May 2008 in time for the ILD LOI.

Mailing List



- ~ 40 people have been already signed up.
- To add yourself go to
  https://lists.desy.de/sympa/lists

and select
  ild-detector-optimisation@desy.de

First Meeting

- First Optimization WG Meeting was held on October 1st.
  - Attendance: JSB, WG conveners and some experts.
  - The purpose of this meeting is to define the strategy for optimization of the ILD detector for the LOI.

Optimization Strategy

- It was agreed that the WG should explore the parameter phase space between LDC and GLD.

- In the first instance this WG will not take cost into account, but will concentrate on producing a parametric description of physics performance.

- Ultimately, the cost/performance optimization will use parametric cost model developed by the costing WG.

ILD Baseline Detector

• It was agreed that, so that work can start immediately, the detector optimization study should be performed in the context of both the LDC detector and the GLD detector.

• Studies will commence using the current LDC and GLD parameters, however in the near future a common set of detector parameters will be used to define LDC' and GLD';

• The detector parameters of this common point will be approximately the average of the current LDC and GLD parameters.

Common Parameters

			GLD	LDC	GLD'	LDC'
TPC		Rin (m)	0.45	0.3	0.45	0.3
		Rout (m)	2.0	1.58	1.8	1.8
		Zmax (m)*	2.5	2.16	2.35	2.35
Barrel	ECAL	Rin (m)**	2.1	1.6	1.85	1.82
		Material	Sci/W	Si-W	Sci/W	Si-W
	HCAL	Material	Sci/W	Sci/Fe	Sci/W	Sci/Fe
EndCap	ECAL	Zmin (m)***	2.8	2.3	2.55	2.55
B-Field (T)			3	4	3.5	3.5
VTX		Inner Layer (mm)	20	16	18	18

- Region between VTX and TPC unchanged in both cases.
* Note for GLD Zmax = 2.3 + 0.2 m for TPC readout. This is included in the standard LDC TPC Zmax
** LDC allows less space between TPC and ECAL than GLD – here let TPC outer radius fix ECAL Rin and all subsequent radii
*** propose to fix ECAL Zmin and let this define the exact details of the TPC endplate region.

Software Tools

- Generator Issues
  - It was agreed in principle that, all physics studies should be based on SLAC generated STDHEP files. However, Jupiter is currently not able to read STDHEP files and this needs to be addressed in the near futrue.

- Analysis Tools
  - It was agreed to perform studies in both the LDC Marlin framework and GLD Satellites framework.
    - We can compare the performance at the common parameter point.
    - LCIO interface has been implemented to Jupiter.

Kick-Off Meeting

- We will have the first ILD detector optimization WG meeting on October 31st.
  - Date: Wednesday 31st October
  - Time: 14:00 (Central Europe), 13:00 (UK), 22:00 (Japan), 08:00 (Fermilab).
    - Please note (we believe) the US is still on Daylight Savings time but Europe and the UK are not.
  - Webex?

Benchmark Processes

• We would like to list up specific physics channels to be studied for the ILD detector optimization. At the kick-off meeting, we'd like to agree on the benchmark Processes and register works currently on going and interests in working on a particular channel.

• We would like to solicit physics processes that should be studied for the detector optimization. The processes will be added to the list.

Benchmark Processes

- e+e- → Zh → llX,

mh = 120 GeV, Ecm = 250/350GeV

→ Test of tracker momentum resolution

- e+e- → Zh; h → cc, tau tau, WW*,

mh = 120 GeV, Ecm = 350GeV

→ Test of heavy flavor tagging (vertex performance)

- e+e- → selectron pair at Point 1, Ecm = 500GeV

→ Test of tracker momentum resolution

- e+e- → chargino pair/neutralino pair at Point 5, Ecm = 500GeV

→ Test of Particle Flow (WW/ZZ separation)

- e+e- → tth

Backgrounds

• For the initial stages of the optimization, unless absolutely necessary, it was decided not to include backgrounds.

- The background then be added in for the final results.

Schedule

- ILD Meeting @ ALCPG Fermilab
  - Oct 23rd, 2007 : This Meeting
  - Oct 26th, 2007 : Mostly Discussion
- Kick-Off Meeting on Oct 31st.
  - Bi-weekly optimization WG meeting.
- ILD Meeting on Jan 2008.
- ILD Meeting @ TILC on March 2008.