# SiD Newsletter

## Upcoming Meetings

ECFA Workshop 2016, Santander, Spain 30/May-5/Jun/2016

LCWS 2016 Japan, December 2016 (tbc)

## 2015 – Taking a look back

*By Marcel Stanitzki*

Looking back at 2015, it has been a year of transition. With the DBD now well in the past and the consortium firmly established, we focus our efforts now to prepare SiD to become one of the detectors for the ILC in Japan. In parallel we of course support the political process in Japan and hope to get some positive signs from there soon.

*Figure 1 SiD Workshop at SLAC, January 2015. Image: Andy Freeberg, SLAC*

SiD started off 2015 with a SiD Workshop (see Agenda here) at SLAC. It was the first workshop after the P5 report and the charge of the workshop was to define a way head in a time of tight resources. To get discussions started, we invited Felix Sefkow from DESY to give a critic's review on SiD, which was very well received and triggered a lot of discussions in the Wednesday session. To get a look, what is happening on the LHC Upgrades, we invited Vitaliy Fadeyev from UC Santa Cruz to report on the CMOS developments for the silicon tracker in ATLAS. A central piece of discussion was the Status of the HCAL, especially the status of the various readout schemes ranging from RPC's and GEMs to SiPMs. The SiD workshop was done jointly with an MDI/CFS workshop, which was a very useful opportunity to discuss with our MDI/CFS colleagues and get the latest information on site-specific issues.

The LCC PAC (Program Advisory Committee) came together for the first time in April 2015 at LAL Orsay. Both SiD and ILD were asked to present the status of the concepts and to discuss the problems and issues the concepts are facing. For SiD, M. Stanitzki reported and made it very clear, that the main issue for SiD is the lack of resources and support, which really slows down any progress. This was echoed by ILD as well. The PAC made several very clear statements in their summary on this issue.


*Figure 2 Group photo during the PAC meeting at LAL, Orsay, France in April 2015. Image: ©CNRS/LAL, Dominique Longerias.*

For many of us attending the PAC, this was kind of the prelude of the ALCW 2015 hosted by KEK. This workshop was the first regional meeting using a new format, the so-called omnibus meeting style. While the organizers provided a framework of several plenary sessions, the individual groups, concepts and R&D collaborations were free to organize their own sessions. This was also done in order to reduce the travel load of many people in the ILC. Overall this was a great success,

hence the same format will be used for the ECFA 2016 Meeting in Santander.

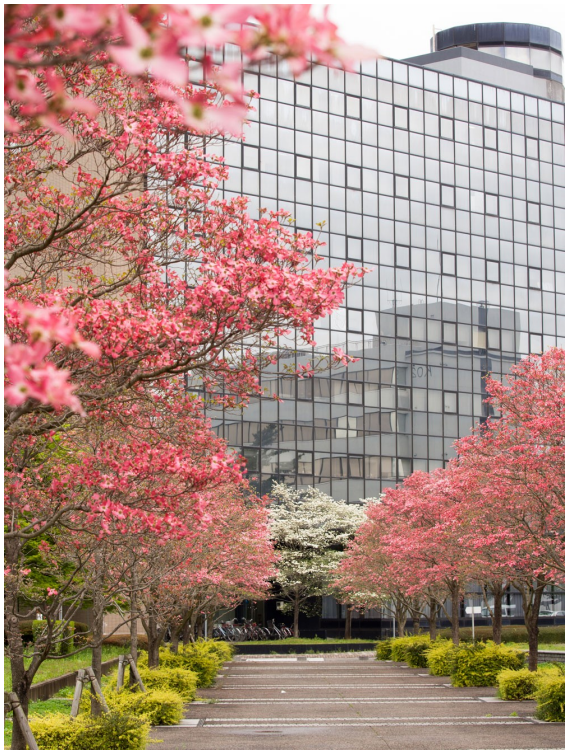

*Figure 3 Flowering dogwoods in full bloom at KEK during ALCW2015. Image: KEK*

A highlight of the workshop was the "Tokyo Event", an open symposium with the latest developments concerning the ILC in Japan. The Linear Collider Community issued a Tokyo Statement to support this event. For the evening we were invited to the "Taste of Discovery", a reception and banquet featuring dishes from all nations currently participating in the ILC. It was a memorable evening notable for many surprisingly well-dressed physicists mingling with the Japanese officials and embassy people.

After a workshop is before the workshop, so besides looking at the news from Japan ( see Report by Andy White), SiD embarked on a busy summer with a lot of activity in the optimization group (see also the Report by Jan Strube). The annual LCWS, was hosted by TRIUMF and they invited us all to picturesque Whistler in British Columbia. And quite against all cliches, we had actually sunshine for four days in a row. The workshop was clearly held in a period of waiting for news from Japan. SiD however presented a series of new results, ranging from new studies from the optimization working group to new engineering efforts and updates on the MDI.

*Figure 4: LCWS 2015 in sunny Whistler, BC. Image: TRIUMF*

A new element of the workshop was the first review by the Physics and Detector Advisory Panel (PDAP) chaired by Paul Grannis. It was agree beforehand to merely hold a "light-weight" review given the available resources.

The feedback included in the PDAP report was very valuable and quite positive for SiD and both SiD and ILD strongly supported the idea to continue such light-weight reviews while the ILC project is in this transitional stage. For the detector R&D groups it is clear, that there needs to be more discussions, as some groups are in strong favor of such reviews, while others are not, mainly because of lack of funding.

Concluding now this year of transition, we hope that 2016 will bring a change in pace for the ILC and hopefully the first green light from Japan.

## ILC Project News

*By Andy White*

2015 saw a significant level of political activity in support of the ILC project. At the "Tokyo Event" there was a major convergence of scientific, industrial, and political constituencies

to discuss the realization of the ILC. Besides highlighting the scientific opportunities of the ILC, the potential economic benefits were discussed, as well as the socio-economic benefits of de-centralization with a future ILC Laboratory in the Northern region of Japan.

*Figure 5 US and Japanese officials and members of the physics community met in Washington, D.C. Image: K. Yoshida*

In April a delegation from Japan visited Washington DC. There was a meeting with accelerator and detector physicists, agency representatives, and members of the JSPS (Japanese Society for the Promotion of Science). A particular outcome of the meeting was the call for the formation of a US-Japan caucus to support the ILC.

The summer saw the publishing of a first interim report of the ILC Advisory Panel, which has been appointed by MEXT following the recommendations by the Science Council of Japan. The report is also available in English and has a series of recommendations, what the panel still would like to understand, among these the impact of LHC results and the question of human resources needed to realize the ILC. It is clear, that the ILC has a very solid physics case and that it also has clear discovery potential especially where the LHC is not sensitive. As it was concluded by LCB, we need to make this more clear to the panel. In general, the report is considered rather positive, but it should be stressed, that this is an interim statement and the final recommendations will only appear in Spring 2016.

In October a delegation from the US Department of Energy visited Japan and a new agreement on scientific cooperation was signed.

During this visit it was suggested to form a working group between the US DoE and the Japan ministry MEXT to begin the discussion of future US support for the ILC. It is hoped to pursue this initiative further in early 2016.

*Figure 6 J. Siegrist (Associate Director, Office of High Energy physics, DOE) and M. Yamauchi (Director General of KEK) sign the agreement while H.E. Ms. Kennedy (Ambassador of U.S.A), H.E. Mr. Shimomura (then Minister of MEXT) look on. Image KEK*

Technically, 2015 saw a “high performance” cryomodule test at Fermilab with the achieved acceleration gradient above the required 31.5 MV/meter for ILC. A split quadrupole magnet, that will significantly simplify the assembly of cryomodules, was designed at Fermilab and a test version shipped to KEK and tested there.

There were two formal change requests to the ILC accelerator design approved in 2015: a new common L* for SiD and ILD, and the insertion of beam position monitors downstream of the first quadrupole magnet. The effects of these changes on the ILC lattice was calculated at SLAC (G. White) and it was shown that the luminosity remains close to the design values for a wide range of center of mass energies.

Finally, a study of the “dark current” (Fermilab) showed that the thickness of the wall between the parallel accelerator and service tunnels could be significantly reduced, with a potentially large cost saving to the project.

In 2016 we look forward to delegations from Japan visiting the US (in February) and Europe (in March), and to a possible statement from MEXT supportive of the ILC project enabling progress to be made globally towards funding the ILC.

## Changing the Baseline

*By Jim Brau and Marcel Stanitzki*

At the SiD workshop in January, 2015, the Consortium concluded that there are strong and compelling arguments to revisit the baseline choice for the SiD HCAL. Following that, and over the summer, the SiD Executive Board discussed in detail, how to proceed in the most transparent way possible with a review of the current baseline and to consider a change, if appropriate. One point that was stressed in the discussion was that the choice of a baseline was for the current optimization of SiD and will likely be revisited again as the ILC matures. The SiD Executive Board proceeded with the reconsideration of the baseline based on the following process:

The spokespersons charge a task force with people from SiD and an external expert to review the available choices and make a recommendation. The recommendation, following the spokespersons' charge, was to be based on performance, technological readiness, risk factors, cost, and impact on the global SiD design.

The task force was appointed, consisting of Jim Brau (convener), Marty Breidenbach and external member Roger Rusack and was charged to begin this process, concluding in time for the SiD Executive Board to receive the recommendation in advance of the SiD meeting during LCWS15 in Whistler, Canada, and so it could be presented to the SiD Consortium at Whistler.

Following the Whistler presentation the SiD Spokespersons circulated the recommendation to everyone on the sid-all mailing list, inviting comments within two weeks. At the end of the process, the spokespersons with the support of the SiD Executive Board will make a decision, whether to accept the change or not.

We have reached the final phase of the process. The recommendation of the task force was presented at the LCWS. Following a discussion of the HCAL advances that have been achieved for both the RPCs and scintillator tiles with SiPMs, the task force presented the recommendation that SiD adopt the scintillator option for the current baseline. We are now considering how to respond to comments we received during the comment period. We aim to conclude the process soon. We all think this has worked quite well and we hope that this process will serve us very well in the future when other major decisions are needed.

## Optimizations going strong

*By Jan Strube*

This year the SiD optimization group has been focusing on backgrounds.

With the TDR in hand, we have a machine design that is well understood, including background processes. The level of radiation that reduces the lifetime of the detectors is five orders of magnitude lower at the ILC than at the LHC. However, the ILC physics program includes precision measurements with errors of a fraction of a percent. To achieve this precision, we must study all sources of background that could affect our measurements, and design the detectors accordingly.

Our background studies are currently still based on the two processes that were studied in the DBD, but with new simulations carried out by the DESY group. The result of these studies, as well as the decision of the machine to change the L* to 4.1 m, will lead to a couple of changes in the layout of the forward region. We hope to finalize the new design in early 2016. This work was mainly driven by the Santa Cruz group. The SLAC group asked the question whether these changes could obviate the need for an Anti-DiD. Removing this requirement would simplify the solenoid design

and engineering significantly. The SLAC group also studied how best to distribute the iron between the barrel and the door to reduce the fringe fields. The new design will have a 30º angle and fields that allow our ILD colleagues to work on their detector while we are in the beam line.

Last, but not least, SiD will move to a new tool suite that will let people move more easily between work on ILD, clicdp and SiD. This work started in collaboration with ILD colleagues at the US-ILC software workshop hosted at PNNL just before LCWS. The Glasgow group is granting us a last look at sidloi3, simulated with this new tool suite, shown below.

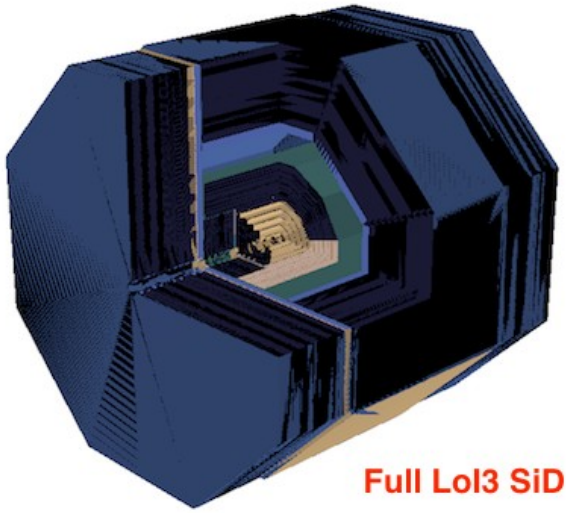


*Figure 7 The sidloi3 model implemented in DD4HEP. This model will help us validate the new tool suite before implementing the new design. Image A. Robson*

Farewell, sidloi3, you have served us well. The new detector will incorporate the results of this year's studies and move us a step closer towards starting a TDR. Next year, we will add more background processes to increase the realism of our simulation, and continue to improve the detector design incrementally. We will need to improve the reconstruction tools to help us study other detector parameters. There's much to do before we can begin a TDR, but we are making steady progress.

## SiD Institute Board news

*By Phil Burrows*

The SiD Institute Board comprises representatives from each of the consortium partner institutes, plus the spokespersons. Since it was set up in 2014 it has met typically at either a dedicated SiD Workshop, or at one of the international LC workshops – the most recent meetings were at KEK (April) and Whistler BC (November). The Board provides a forum for open discussion about major strategic issues for SiD.

For example, at recent meetings we've had discussions about the baseline technology for the HCAL, as well as on options for SiD engagement with detector R&D activities at possible future circular $e^+e^-$ colliders. These debates have been open, frank, and constructive and are a healthy indicator of an engaged and committed community. The Board also considers applications for membership of SiD from new institutes. Any institute considering membership is warmly invited to contact me, with a short statement about their interests in SiD and brief details about the relevant people at the institute who comprise the interested team. Come and join the fun!

## Happy Holidays !

We wish you all very Happy Holiday and a productive 2016!

We would like to thank everyone who supported SiD this year by attending meetings, giving talks, writing reports, carrying out detector R&D and physics and detector simulations, and by expressing support of SiD and the ILC. We look forward to an exciting 2016 for SiD and are awaiting eagerly the news from Japan!