International Workshop on Future Linear Colliders

LCWS2016

5-9 DECEMBER , 2016
Aiina Center & MALIOS ,
MORIOKA CITY , IWATE , JAPAN

The workshop will be devoted to the study of the physics cases for future high energy linear electron positron colliders, taking into account the recent results from LHC, and to review the progress in the detector and accelerator design for both the ILC and CLIC projects.

LC Detector R&D: Report from Liaisons

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TOHOKU UNIVERSITY

Detector R&D Liaison Report

Working group - Detector R&D liaison

Detector R&D liaison (http://www.linearcollider.org/P-D/Working-groups/Detector-R-D-liaison)

The detector R&D liaison ensures productive communication between the LCC Physics and Detectors Executive Board and detector R&D groups. The liaison is a member of the Executive Board and communicates relevant information from the Executive Board to detector R&D groups and vice versa. The liaison is in contact with all detector R&D groups relevant to linear colliders to keep track of the overall detector R&D efforts conducted or planned for linear colliders and to periodically compile summaries of the efforts.

- Jan Strube (deputy liaison)
- Maksym Titov (liaison)

Presentations

- *Report from the Detector R&D Liaisons (http://agenda.linearcollider.org/event/6301/session/13/contribution/24/material/slides/1.pdf)*, J. Strube, M. Titov
  2014 Americas Workshop on Linear Colliders (AWLC14), Fermilab, USA (May 12-16)
- *Status Report of the LCC Detector R&D task force (https://agenda.linearcollider.org/event/6440/contribution/18/material/slides/1.pdf)*, J. Strube, M. Titov
  2014 SiD Meeting, University of Tokyo, Japan (Sep. 2-3)
- *Status Report of the LCC Detector R&D task force (https://agenda.linearcollider.org/event/6360/session/7/contribution/28/material/slides/1.pdf)*, J. Strube, M. Titov
  2014 ILD Meeting, Oshu City, Iwate, Japan (Sep. 5-9)
- *LC Detector R&D: Report from Liaisons (https://agenda.linearcollider.org/event/6389/session/17/contribution/19/material/slides/1.pdf)*, J. Strube, M. Titov
  2014 International Workshop on Future Linear Colliders (LCWS14), Belgrade, Serbia (Oct. 6-10)
- *ILC Detector R&D: Report from R&D Liaisons and French contributions (https://indico.in2p3.fr/event/12649/session/7/contribution/8/material/slides/0.pdf)*, J. Strube, M. Titov
  2016 - 4th French Linear Collider Days, Paris, France (March 23-24)

https://www.linearcollider.org/P-D/Working-groups/Detector-R-D-liaison

Detector R&D Liaison Report: get an overview over LC Detector R&D Efforts

- Update of the R&D developments since ILC DBD and CLIC CDR
- "Publicize" the technology. Summarize contributions of individual R&D efforts.
  → Make areas of overlap obvious without pointing out (not an attempt to control R&D)
- Provide a "showcase" for the technology. Manpower and financial resources are explicitly not mentioned in the report.
- Provide an entry point for new groups → help them to learn the current landscape of the LC R&D efforts and the areas where they can contribute

EFFORT STARTED 1.5 YEARS AGO → WE ARE LATE, BUT FINALLY WILL PUBLISH → RELEASE IN EARLY 2017

Detector R&D Liaison Presentations

ILC Detector R&D:
Report from Liaisons

ILC Accelerator and
Detector Spin-Offs
(some remarks)

LCCPDeb
Detector R&D Liaisons:

Jan Strube (PNNL)
Maxim Titov (CEA Saclay)

ILC Spin-Offs:

Marc Winter (IPHC Strasbourg)

ECFA Linear Collider Wor
Santander, Spain

ILC Detector R&D:

Report from R&D
Liaisons &
French contributions

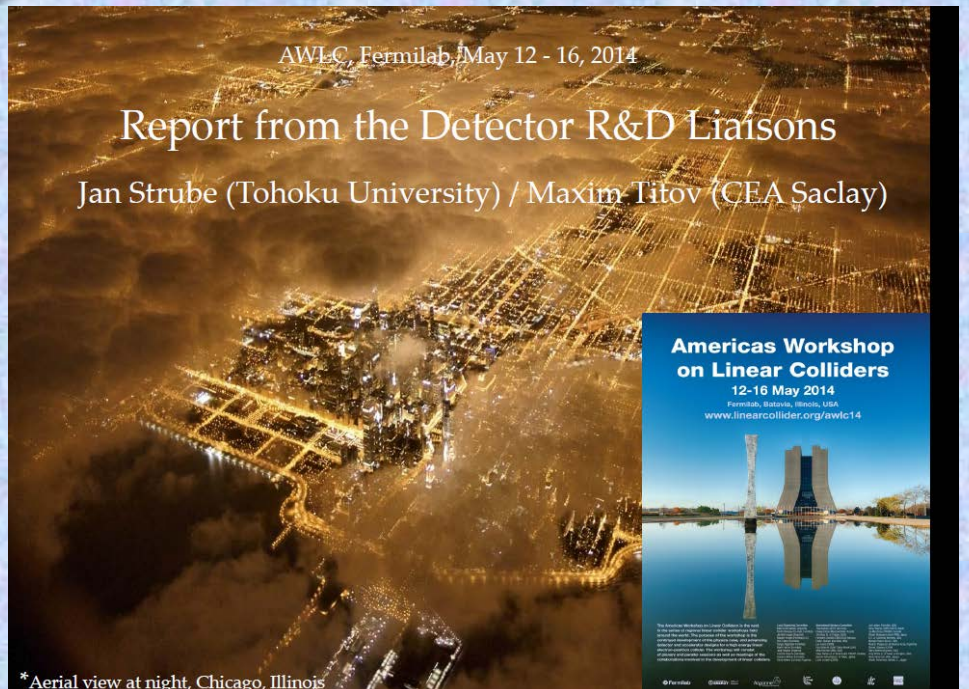
LCCPDeb
Detector R&D Liaisons:

Jan Strube (PNNL)
Maxim Titov (CEA Saclay)

4èmes Journées Collisionneur
Linéaire,
Paris, France,
March 23-24, 2016

Comprehensive source of information on ongoing LC detector R&D

Plenary Talk, Belgrade, Serbia, October 6, 2014



*Aerial view at night, Chicago, Illinois

Detector R&D Liaison Report

- > ~ 50 individuals R&D groups contacted
- List of responses was rather variable → from pointers to past publications to 100+ page documents; from text in the mail to bullet points and to 18+ dedicated pages
- Today: Detector R&D Liaison Report is being written in LaTeX.
  → Currently 150 pages + > 10 pages references.

❖ Separate Chapter - ILC Detector R&D Spin-Offs (not comprehensive one)

Detector R&D Report

Editors
Jan Strube — jan.strube@pnnl.gov
Maxim Titov — maxim.titov@cea.fr

Contents

ILC Detector R&D Liaison report structure:
- Motivation and Constraints of the sub-detector in a Linear Collider (by R&D Liaisons)
- Write-up for each technology
- Summary table
- Executive Summary (by R&D Liaisons)

Detector R&D Liaison Report: Summary

- Following discussions at the Whistler'2015 LCWS Meeting, it was agreed:

  - Publication:
    Report to be available on the LCC Website
    Not to be published on arXiv or in a Journal
    Live document, updated periodically, much like online documentation

  - Authorship: 2 editors (Liaison, Deputy)
    One contact person per technology

- Report includes:
  R&D activities which are part of Calice, ILCTPC and FCAL and separate R&D efforts, which are not part of ILC and SiD concepts (e.g. some vertex technologies, dual-readout calorimetry)

  - Should not be considered as the summary to select between technologies → general overview of the landscape of the LC R&D activities

  - Available to general public and all newcomers interested in ILC R&D

2011 - 2016: ECFA Detector R&D Panel

Chaired by Yannis Karyotakis (LAPP, France)

Review of ILC R&D Efforts (http://ecfa-dp.desy.de):

- May 2-3, 2012: Different R&D
  https://indico.desy.de/conferenceDisplay.py?confId=5800
- Nov. 5, 2012: CALICE R&D
  https://indico.desy.de/conferenceDisplay.py?confId=6830
- Jun. 10, 2013: FCAL R&D
  https://indico.desy.de/conferenceDisplay.py?confId=7893
- Nov. 4-5, 2013: LCTPC R&D
  http://indico.desy.de/conferenceDisplay.py?confId=8573
- Jun. 11-12, 2014: Vertex Detector R&D
  https://indico.desy.de/conferenceDisplay.py?confId=10026

ECFA Detector R&D Panel

LCTPC

Review Report

LCTPC: ~ 70 pages

LCTPC collaboration

LC-DET-2014-001

November 3, 2013

arXiv: 1212.5127

Calorimetry for Lepton Collider Experiments – CALICE results and activities*

The CALICE Collaboration

CALICE: ~ 70 pages

Abstract

The CALICE collaboration conducts calorimeter R&D for highly granular calorimeters, mainly for their application in detectors for a future lepton collider at the TeV scale. The activities ranges from generic R&D with small devices up to extensive beam tests with prototypes comprising up to several 100000 calorimeter cells. CALICE has validated the performance of particle flow algorithms with test beam data and delivers the proof of principle that highly granular calorimeters can be built, operated and understood. The successes achieved in the past years allows the step from prototypes to calorimeter systems for particle physics detectors to be addressed.

Status Report

FCAL Collaboration

June 2013

FCAL: ~ 70 pages

Abstract

Two special calorimeters are foreseen for the instrumentation of the very forward region of an ILC or CLIC detector; a luminometer (LumiCal) designed to measure the rate of low angle Bhabha scattering events with a precision better than 10^{-3} at the ILC and 10^{-2} at CLIC, and a low polar-angle calorimeter (BeamCal). The latter will be hit by a large amount of beamstrahlung remnants. The intensity and the spatial shape of these depositions will provide a fast luminosity estimate, as well as determination of beam parameters. The sensors of this calorimeter must be radiation-hard. Both devices will improve the e.m. hermeticity of the detector in the search for new particles. Finely segmented and very compact electromagnetic calorimeters will match these requirements. Due to the high occupancy, fast front-end electronics will be needed.

Monte Carlo studies were performed to investigate the impact of beam-beam interactions and physics background processes on the luminosity measurement, and of beamstrahlung on the performance of BeamCal, as well as to optimise the design of both calorimeters.

Dedicated sensors, front-end and ADC ASICs have been designed for the ILC and prototypes are available. Prototypes of sensor planes fully assembled with readout electronics have been studied in electron beams.

From 2017: Expanded Mandate for ECFA Detector R&D Panel

ECFA European Committee for Future Accelerators

ECFA Detector R&D Panel

From H. Abramowicz talk, ECFA Chair, Nov. 24,2016

New mandate expanded beyond LC activities

New structure

ECFA/16/298, http://cds.cern.ch/record/2211641

- Panel will have an advisory role with 4 to 5 experts
- Panel will set up review committees on demand
- Panel will constitute a contact point for new activities/groups

HA PECFA100, Nov 24/25, 2016, CERN 19

New Detector R&D Panel
(Chair to be selected by the panel):

Astroparticle - Els Koffemann (NL)

Calorimetry - Laurent Serin (FR)

Gaseous Detectors - Silvia Dalla Torre (IT)

Silicon - Phil Allport (UK)

Electronics/DAQ - Arno Straessner (DE)

General - Lucie Linssen (CERN)

Scientific secretary – Doris Eckstein (DE)

Ex-officio - Ariella Cattai (ICFA, CERN)

- The ECFA Detector Panel provides advice on detector development efforts for projects at accelerator and non-accelerator experiments in particle and astroparticle physics.
- The Panel may monitor detector R&D programs on request → continue to review ILC detector R&D efforts (ILCTPC, CALICE, etc …)
- The Panel reports to ECFA once a year. It also reports to APPEC when appropriate