Minutes of the 9th "ILC-CLIC e+ studies" meeting

Date: November 19th, 17:30(JST) 9:30(CET), 2009

A part of Attendees (whom Omori was able to hear the voices):
Louis(CERN), Vivoli(CERN), Eugene(NSC-KIPT), Chehab(IPNL/LAL),
Sabine(DESY-Z), Andriy(DESY-Z), Andreas(DESY-Z), Stefan(DESY),
Lanisa(DESY-Z), Gudi(Durham/DESY), Clarke(CI), Kamitani(KEK),
Urakawa(KEK), and Omori(KEK)

Agenda

1. Brief introduction to the positron source group Wiki: Andreas-san
2. Brief summary of the CLIC09 workshop: Louis-san
3. Report on the BN window test at KEKB: Omori

Presentations:

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20091119/
20091119-Andreas_WikiIntroduction.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20091119/
20091119-Louis_CLIC09WS_Summary.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20091119/
20091119-Omori_BNwindowTest.pdf

1. Brief introduction to the Positron Source Group Wiki:

   Andreas-san presented the newly created "e+ source Wiki"
   page.

   Please see "20091119-Andreas_WikiIntroduction.pdf".
   This is the handout version of his presentation.
   For real experience of the Wiki, please visit
   https://znwiki3.ifh.de/LCpositrons/.

   According to Andreas-san, a wiki is a collection of websites,
   which not only can be read, but can also be edited by the
   users directly and simply.

   Andreas-san described the wiki-way.
     * open and cooperative: on many sites, everyone may change
       everything.
     * simple and fast: you can enter and save any content,
       which is available at once.
     * Content is more important than design.
     * safe: MoinMoin remembers all old page versions.
     * cross-linked: the information in the wiki is highly
       linked.
     * accessible: you only need a browser and a network
       connection to access the wiki.
     * flexible: in a wiki you can save many kinds of

information, e.g. training courses, transparency lectures, and brainstorming.

Andreas-san explained why Wiki is desired for Positron Source Group. He compared the two existing Web infrastructures of Positron Source Group; "ILC EDMS" and "Sources page at Durham". He summarized both Web infrastructures with pros(+) and cons(-).

* ILC EDMS
  (+) every source group member can edit.
  (-) difficult to use.
  (-) need expert knowledge for some tasks.
  (-) not used much for Positron source R&D.
  (-) not readable from outside.

* Sources page at Durham
  (+) readable from every where.
  (+) good collection of information.
  (-) editable by a single admin.
  (-) difficult to edit from outside.

The goal of the Positron Source Group Wiki was described by Andreas-san. It was to provide an easy-to-use Web platform for positron source related information. Every member of the Positron source group should be able to contribute. The system should complement EDMS, and existing static Webpages.

Andreas-san explained the basic usages and the advanced usages of the Wiki, including how to create your account.

Summary
* new MoinMoin wiki is setup at https://znwiki3.
* usage is easy.
* Web interface reachable from everywhere.
* GUI for editing exists (use of Text mode also straightforward).
* every member of the positron source group is invited.
* open to comments, question and suggestions.

2. Brief summary of the CLIC09 workshop:

Louis-san reported the CLIC 09 workshop summary for the Injector Complex working group.

Please see "20091119-Louis_CLIC09WS_Summary.pdf".

The workshop was held on 12-16 October 2009.
There were, 250 participants, from 21 countries,
from 62 institutes, including 20 plenary talks,
and 142 parallel talks, with 5 working groups.

Please visit the WS website to get the entire information.
http://indico.cern.ch/conferenceDisplay.py?confId=45580

Louis-san summarized the working group on injectors (WG).

The mandate of the ILC-CLIC source working group was reviewed.

   For polarized electron sources, ILC and CLIC studies are
   based on photo-injectors using a DC gun with different
   parameters.

   For polarized positron sources, the ILC study considers
   the undulator option as the base line while the Compton
   schemes are alternative options. The CLIC study considers
   the Compton schemes as the base line while the undulator
   is an alternative option. Additionally, both projects
   are interested in the development of conventional
   sources (ILC as an alternative option and CLIC as
   the baseline for the CDR).

Then CLIC parameter sets for the source were summarized.
   For detail, please see page 5 of
   "20091119-Louis_CLIC09WS_Summary.pdf".

Next, challenges for the e-/e+ source were summarized.
  Electrons:
     * Reliable load locked gun, High voltage; Ultra-high
       vacuum requirements; Cathode/anode optics.
     * Production of the full current with space charge
       and surface charge limits.
     * Photocathode high polarization; High Quantum
       Efficiency and Long life time.
     * Laser frequency, Pulse length and Pulse energy.
  Positrons:
     * A single hybrid targets station or several stations
       to cover all the CLIC needs.
     * Devices for Undulator scheme (Helical undulator,
       collimators, dumps,…).
     * Devices for Compton schemes (Optical cavities at IP,
       powerful laser systems,…).
     * Targets issues (Heat load dynamics, beam energy
       deposition, shock waves, breakdown limits,
       activation, ….).
     * Adiabatic Matching Device (AMD)
     * Capture sections (Transport and collimation of large
       emittances, high beam loading).
     * Trade off between yield, polarization and emittances
     * Design and implementation of the spin rotators.
     * Polarization issues (Analyze systematic errors of
       polarization measurements).
     * Efficient use of existing codes (EGS4, FLUKA, Geant4,
       PPS-Sim, Parmela, …).
     * Integration issues for the target station (remote
       handling in radioactive area).

Then Louis-san reviewed several reports in the WS.

  * Polarized e- produced at SLAC (J. Sheppard)
  * Polarized e- at JLAB (M. Poelker)
  * KEKB hybrid source experiment (T. Takahashi)
  * Hybrid source optimization (O. Dadoun)
  * Pre-accelerator results at 200 MeV (F. Poirier)

* Injector linac results at 2.8 GeV (A. Vivoli)
* Bhabha polarimeter at 200 MeV (S. Riemann)
* CLIC Compton ERL (T. Omori)
* CLIC Compton Linac (V. Yakimenko)
* CLIC Undulator scheme (W. Gai)
* PHIN results at CERN (M. Petrarca, O. Mete)
* Highlights for the CDR (L, Rinolfi)
* Collaborations (L. Rinolfi)

Finally, Louis-san ended the report with the final remark of the WS (not the injector WG) by B. Barich;

* The central frontier of particle physics is and will continue to be the energy frontier,
* The LHC will open a new era at that frontier and its discoveries will motivate the next machine, --- a lepton collider,

and the summary of a summary of the WS by K. Peach;

* we need the technology to meet the challenge.

3. Report on the BN window test at KEKB:

Omori reported the result of the BN window test experiment on October 22nd.

Please see "20091119-Omori_BNwindowTest.pdf".

BN stands for boron nitride, it is a ceramics. Since BN has very good heat conductivity and low expansion rate, BN is very strong against thermal shock. So, BN is a candidate material for the windows of the liquid lead target of the 300 Hz option of the ILC e+ source.

The aim of the experiment was to test strength of the BN window against the shock wave caused by heat which was originated by EM shower.

The experiment was performed at the abort dump of the KEKB high energy ring (HER). The 8 GeV HER beam was used for the experiment.

Two target samples were prepared for the BN window test.

A target sample consisted of BN plate (t=4mm), solid lead converter (22.4 mm), and BN plate (t=4mm). This sandwich was fastened by 8 bolts. Then the sample was mounted in a pipe with a lid for easy and safety handling. Then the pipe was installed in the hole of the beam dump.

In the two samples, we called Sample-1 and Sample-2, slightly different kind of BN materials were used; N1 for Sample-1 and NB-1000 for Sample-2.

The Sample-1 firstly irradiated by 460 mA beam (2.9 nC/bunch x ~1600 bunches). This irradiation was occurred accidentally by beam about triggered by an interlock. Then 800 mA irradiation (5nC/bunch) was

performed to Sample-1.

To Sample-2, 800 mA irradiation (5nC/bunch) was performed.

The result was that the two sample were largely destructed. Large portion of the lead was melted. The simulations performed after the experiment suggested that a small portion of lead was even vaporized.

The experiment was a failure.

The reason of the failure was a lack of consideration in a planning stage.

Total energy of the beam (8 GeV, 5 nC/bunch, 1600 bunches) was 64 kJ. Energy deposit on the target (~12 % of Energy of the beam) was estimated to be 7.7 kJ. This large energy deposit caused the destruction of the samples.

Apparently, in the experiment on Oct/22nd, we did not test the BN strength against the shock wave.

The experiment group is considering the next step.

The date of the next phone meeting will be January 14th.

Reported by T. OMORI