

Minutes of the 13th "ILC-CLIC e+ studies" meeting

Date: April 15th, 17:00(JST) 10:00(CET), 2010

A part of Attendees (whom Omori was able to hear the voices):
Louis(CERN), Vivoli(CERN), Eugene(NSC-KIPT), Peter(NSC-KIPT),
Chehab(IPNL/LAL), Variola(LAL), Chenghai(IHEP/LAL), Freddy(LAL),
Sabine(DESY), Andreas(DESY), Stefan(DESY), Norbert(STFC),
Mike(), Ian(Victoria), Takahashi(Hiroshima), Kataoka(Seikei),
Araki(KEK), Urakawa(KEK), and Omori(KEK)

Agenda:

1. Quick report on the hybrid target test on Apr/10-11: Takahashi-san
2. Report from Beijing GDE meeting (WG1 summary) : Louis-san
3. POSIPOL 2010 : Omori

Presentations:

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20100415/20100415_HybridExp_Takahashi.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20100415/20100415_ILC2010_e+_summary_Louis.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20100415/20100415_POSIPOL2010_Omori.pdf

1. Quick report on the hybrid target test on Apr/10-11:

Takahashi-san presented a brief report on the hybrid target experiment at KEK-LINAC.

Please see "20100415_HybridExp_Takahshi.pdf".

The experiment was done on April 10th-11th.
This was the 3rd experiment of the series.

The experiment was performed at the end of the KEK 8 GeV linac. (the injector to the KEKB ring and the KEK photon factory rings)

Here is the specification of the lineac.

- * E(beam) : 8GeV
- * Bunch Charge: ~nC
- * Repetition : up to 50Hz

Purposes of the 3rd experiment:

- * establish methods of temperature measurements
 - by thermocouples
 - by infrared thermometer

- * momentum dependence
 - 20 MeV, 10 MeV and 5 MeV
- * bunch charge was increased
 - 0.5 nC in January --> 1.5 nC at the monitor Q(1st)
 - about factor 2 larger on the target

Hybrid configuration:

8 GeV e- beam on 1 mm crystal tungsten (on or off axis)
 All charged particles up to 8 GeV swept out
 Only gamma-rays on amorphous tungsten (8 mm or 18 mm)

Conventional configuration:

8 GeV e- beam on amorphous tungsten (8 mm or 18 mm)

Measurement:

Number of positrons from the amorphous target.
 (Momentum window 20 MeV, 10 MeV, and 5 MeV)
 Temperature at the exit of the target by thermocouples
 and the infrared camera.

On each amorphous target, three thermocouples are mounted on the down stream surface. (In the previous experiment in January, one thermocouple on each target was mounted)
 Size of the thermocouple is approximately 1mm x 1mm.

Temperature measurement at saturation were done.
 In addition, fast measurement was performed. The central thermocouple connected to the fast data logger which read temperature each 10 ms.

-> try to measure local temperature rise for each bunch PEDD information by thermocouple.

Temperature rise by single bunch was successfully observed.

Status and outlook

- * in general, data appeared to be consistent with previous one.
- * temperature measurement with thermocouple seems useful.
 - total energy deposit as well as PEDD
 - more to be analyzed
 - temperature data with the infrared camera was also obtained. yet to be analyzed.
- * momentum distribution was measured for
 - 20 MeV, 10 MeV, 5 MeV
- * more detail for temperature expected in July

Questions and Comments:

Question by Chehab-san:

Did the beam profile change when you increased a bunch charge?

Answer by Takahashi-san:

We did not measure the spot size precisely.
 We observed the beam profile by optical camera.
 We can say that no significant change was observed.

Question by Chehab-san:

Do you expect that you can measure temperature profile by single bunch by the infrared camera?

Answer by Takahashi-san:

We are not sure. But we will try.

2. Report from Beijing GDE meeting (WG1 summary):

Louis-san made the report from Beijing GDE meeting (WG1).

Please see "20100415_ILC2010_e+_summary_Louis.pdf".

* Session 1: Polarized electron source:

- SLAC: A. Brachmann
ILC/CLIC requires large laser beam to reduce current density. Plan is still to complete laser system and generate a polarized electron beam R&D on photocathodes. Slow progress due to limited resources. Collab. with JLAB.
- Nagoya: M. Yamamoto
200 kV electron gun: GaAs-GaAsP superlattice provides high QE and high polarization (88%)
500 kV electron gun: high voltage conditioning was succeeded up to 550 kV
(JAEA/KEK/Hiroshima/Nagoya/Yamaguchi Univ.)
- BINP: V. Telnov
Proposal RF gun based electron source to suppress the electron Damping Ring.
 - Omori's comments:
After Beijing, an error was found in the calculation, then Telnov-san withdrew this presentation.

* Session 2: Undulator based source:

- Lancaster University (UK): I. Bailey
Undulator prototype working well apart from heat problem. Magnet field quality mostly excellent
For the material tests, there is plan to use collimator data from ATF2 to calibrate beam-induced shock wave simulations (related to target issues).
- Cornell: A. Mikhailichenko
Li lens calculation. It is complicated and needs to be digested. Further studies are expected. There is request for budget and manpower.
- ANL: W. Gai
Update of simulation results for SB2009. Studies for various "undulator configurations" at the end of linac including polarization issues for high energy. Energy depositions are compared into Ti and W targets => needs experiments.
- LLNL: J. Gronberg
Vacuum seal issues for rotating target are studied and no conclusion yet.
Engineering design of flux concentrator for long pulse (1ms) has been made including stress and thermal

calculations.

- Omori's comment:

The study of the rotating vacuum seal is very critical to ILC e+ source.

- Comments by Chehab-san and Omori.

In the current LLNL design of the flux concentrator, the distance between the target and the B-field maximum is too large. This may cause a significant drop of the capture efficiency.

* Session 3: Conventional positron sources including channeling

Collaboration: BINP/CERN/Hiroshima/IHEP/IPNL/KEK/LAL

- IPNL: R. Chehab

Hybrid source using channeling is proposed for ILC (modification of beam pulse structure => less energy per pulse on the target).

- Hiroshima University: T. Takahashi

Experimental results, at KEK, for hybrid targets using channeling have been presented.

Parameters space for conventional sources has been revisited. => Idea is to investigate the use of purely conventional positron source for ILC.

- KEK: T. Omori

Liquid lead target R&D for 300 Hz scheme has been presented.

BN window tests at KEKB ring have been reported.

Prototype liquid lead target at ATF linac with BINP collaboration has been described.

- CERN: L. Rinolfi

Hybrid source using channeling for CLIC have been presented and discussed (baseline for the CDR).

* Session 4: Polarized positron sources (Compton, ERL, Linac,...)

- BNL: M. Polianskiy

Compton Linac: there is an active CO2 development program required for ILC pulse parameters.

However no direct funding is yet provided to the facility.

- LAL: A. Variola

ERL: there is a strong development for Compton source with simulations and experimental program. Scheme seems promising (stacking in the DR) but a lot of work to do before an engineering design.

(not enough available resources to study all the schemes)

- KEK: T. Omori

Compton ring: Gamma generation experiment is ongoing at ATF with 2 mirrors cavities

(enhancement factor has been increased by a factor 3)

Studies with 4 mirrors cavities are ongoing towards smaller spot size and higher enhancement (with LAL / Hiroshima)

- Kharkov Institute: E. Bulyak

Compton ring: the design of such ring based on laser-cooling is able to generate the requested flux of photons in continual mode BUT problems to overcome (0.5 J laser, RF 200 MV, timing,...)

* Session 5: General discussion

- AAP summary: J. Clarke
The AAP review (Oxford) has been presented and discussed regarding the positron source. One of the recommendation: "AAP encourages intensification of the R&D on positron target"
- "ILC-CLIC e+ generation" working group: L. Rinolfi
The present workplan and the achieved milestones have been presented. A review of the workplan will be made very soon for the next period related to the TDP.
- Rotation targets: T. Omori
Learning from SLC and NLC experiences, several options have been considered and possible risks have been explored.

3. POSIPOL 2010:

Omori reported the status of the preparation of POSIPOL 2010.

Please see "20100415_POSIPOL2010_Omori.pdf".

* By now (April 15), 24 participants made registration.

* Program Outline is decided:

- 31/May
 - 08:30-09:00 Registration
 - 09:00-18:00 Session
- 01/June
 - 09:00-14:30 Session
 - 14:30- Social Event
- 02/June
 - 09:00-18:00 Session

* Social Event

Visit Sensouji Temple and Yakatabune dinner cruise.

The date of the next phone meeting will be decided later.

Reported by T. OMORI