

Minutes of the 24th "ILC-CLIC e+ studies" meeting

Date: November 17th, 17:00(JST) 9:00(CET), 2011

A part of Attendees (whom Omori was able to hear the voices):
Louis(CERN), Chenghai(IHEP/LAL), Eugene(NSC-KIPT),
Peter(NSC-KIPT), Sabine(DESY), Andriy(DESY),
Takahashi(Hiroshima), Urakawa(KEK), and Omori(KEK)

Agenda:

1. Report of DESY BTR meeting : Omori
2. Discussions on the date of POSIPOL 2012 : Sabine-san
3. The time slots of the phone meeting : Omori

Presentations:

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20111117/20111117-Omori_DESY_BTR.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20111117/20111117-Sabine_Posipol2012.pdf

http://www-jlc.kek.jp/~omori/ILC-CLIC-e+Studies/20111117/20111117-Omori_TimeSlot.pdf

1. Report of DESY BTR meeting:

Omori made a report of the Baseline Technical Review(BTR). The BTR was held at DESY on 24-27 October 2012.

Please look at "20111117-Omori_DESY_BTR.pdf".

Omori reported some topics from BTR presentations/discussions. Selection of the topics was done based on necessary of "pay attention". If some topics showed no problem, the subjects were skipped even they were important.

Following are the topics reported by Omori. (Names in parentheses are the presenters at BTR meeting.)

(a) Flux concentrator (Jeff-san):

Full size test is planed at LLNL, the test will be at slow repetition rate. Reduced peak field (3-3.5) is TDR baseline (if we employ 6 Tesla, the mechanical stress is too high). But the

effect of the reduced peak field on the capture efficiency is small.

- (b) Rotation vacuum seal (Jeff-san):
Full size test of Vacuum rotation target is ongoing at LLNL.
The first step, testing of the Rigaku ferrofluidic seal in a separate test stand, was failed. The seal was destroyed. The cause was under study. LLNL continues a test with a plug compatible Ferrotech seal. Rigaku will make an investigation and repair of the destroyed seal.
- (c) Truly conventional e+ source (Omori):
The truly conventional e+ source (300 Hz and slow rotation target) was designed by the 11 authors of IHEP, ANL, DESY, Hiroshima, U. Tokyo, U. Hamburg, and KEK. The conclusion was that the conventional e+ source was OK for ILC. The source will be put into TDR vol_1 with a cost estimation.
- (d) Keep Alive/Auxiliary Positron Source (Kuriki-san):
* Start up e+ source is very important in MD phase.
* In the initial phase, 3X0 W-Re instead of 0.4X0 Ti alloy improves the e+ intensity.
* 500 MeV single bunch S-band accelerator (30m) can generate 20 % intensity e+ beam.
* The target can be replaced when undulator is ready for the commissioning. KAS becomes a small backup with a few % intensity.
-- REPLACEMENT scenario --
* Could W-Re (or W) and Ti alloy be implemented in a same target ? (Hybrid).
-- MOSAIC TARGET scenario --
- (e) Positron polarization issues (Sabine-san):
* To suppress A/L asymmetries of the machine is important to avoid systematic errors in physics studies.
* Machine A/L asymmetries:
- A_L = asymmetry in luminosity for LR and RL
- A_Peff = asymmetry in L and R polarization
- A_L is more important than A_Peff
* Fast (= 5 Hz) helicity reversal is important to cancel remaining A_L and A_Peff.
* Sabine-san proposed to employ two parallel spin rotation lines(#) which allows 5 Hz helicity reversal.
(#) K. Moffeit et al., SLAC-TN-05-045.
But Nick-san pointed out that the two-parallel-line scheme introduces asymmetry of injection efficiency to DR then introduces A_L.
We need further investigation.

(f) Bunch compressor, 1-stage or 2-stage?:
(Accelerator point of view was reported by Yokoya-san)
(Physics point of view was reported by Mikael-san)

(1) PMS's decision:

2-stage bunch compressor (BC) is TDR Baseline.
(single stage was baseline of SB2009)
bunch length is still 300 micron.

(2) Consensus:

2-stage BC has larger flexibility, better
tolerance on phase.

(3) Discussions (NO decision):

The 2-stage BC has possibility to go to
the modified-Gao parameter (or variant).

- shorter bunch length: 150um - 220um.
- smaller beta*.

- smaller bunch charge: 1×10^{10} (1/2 of RDR).
- larger bunch number: 2600 (= RDR).
- better emittance preservation.

The parameter gives us the same
peak-luminosity, but much smaller pair
background; $\sim 1/3$ per bunch.

(g) Beam spectra (Omori's request to Sabine-san):

The e- and e+ beam spectra presented by Mikael-san
were impressive. The e+ beam energy spread was
much smaller than that of the e- beam.

Since the e- beam was used for positron generation,
the energy spread of it was deteriorated.

If we generate positrons by a conventional source,
the energy spread of e- beam is not deteriorated.

Omori asked Sabine-san to evaluate physics
performance of ILC with a conventional e+ source.

(h) Positron Timing Considerations (Kuriki-san):

In ILC, positron generation is done by the
electron beam (electron-positron correlation).

So we have a constraint on the path length of
"round trip from DR to IP"

* The constraint:

$L3+L4-L2+D1=n \cdot C_{DR}$

L2:Electron BDS.

L3:Positron main linac.

L4:Positron transfer line.

D1:Distance from DR extraction to injection.

C_{DR} : DR circumference

n: integer

(i) STATUS of E+/- GLOBAL TIMING (Ewan-san):

In order to fulfill the requirement (h), Ewan-san made a proposal.

The Proposed Global Timing Correction System

- * Get initial installed path lengths correct to 10mm.
- * Design a 50 m long simple 4 magnet chicane whose central magnets can be moved horizontally by up to 1.5 meters from a straight line with two vacuum pipes and bellows to allow changes under vacuum. NOT a motorized system.
- * Install it in RTML between BDS and end of e+ linac.
- * During commissioning one can use DR path-length adjustment to measure motion required and manually move chicane system. Then during operation DR system is optimized for DR alone.

(j) PM's decision:

PMS made 5 decisions, (1)-(5) at the end of BTR. (Items (4) and (5) were skipped in Omori's talk.)

- (1) Source: Reduce the field of flux concentrator as baseline for TDR.
- (2) Source: Auxiliary source with Kuriki's parameter.
- (3) Two staged bunch compressor (resumed) instead of the single bunch compressor once proposed in SB2009.
- (4) Booster (up to 5 GeV) HLRF rating to include current overhead x 1.5 (for redundancy).
- (5) Booster HLRF would not to be with KCS. (DRFS or RDR would be encouraged, depending on the site and CFS condition).

2. POSIPOL2012 preparation:

Sabine-san reported the preparation status of POSIPOL 2012.

Please look at "20111117-Sabine_Posipol2012.pdf".

The venue of the POSIPOL is decided: DESY Zeuthen.
Nearest airport: Berlin-Schönefeld airport.

Public transportaion:

S-Bahn:

- ~8 min walking distance to Zeuthen station
- ~45-50 min with S-Bahn to Berlin city centre

Possible Date:

There are many conferences, workshops, and meetings in 2012. Please look at page-8 of "20111117-Sabine_Posipol2012.pdf".
It is very difficult to choose the date.
We need discussions.

Local organizers:

- * Zeuthen: Sabine, Friedrich, Martina Mende
- * Hamburg: Gudi, et al.

International Program Committee:

We need discussion.

Program: to be discussed later in IPC

List of possible subjects:

- * Positron generation
 - Methods (conv., undulator, compton, channeling,..)
 - Targets (ILC, CLIC, powder, hybrid,...)
 - New results
- * Positron capture and transport
- * Positron polarization
- * New results and developments
- * Applications
- * ...
- * Proceedings?

Accommodation

- * on Campus : =< 12 rooms
- * Nearby:
 - Seehotel, 4.5 stars (1.7km walking distance)
 - Hotel Seeblick (~1.2km walking distance)
- * Hotels in Berlin:

Positron source meeting ?

- * 1-2 days before/after POSIPOL ?
- * Discussion of TDR issues
- * Are face-to-face meetings planned for the e+ source people in 2012 ?

Sightseeing:

Berlin and Potsdam were recommended.

3. The time slots of the phone meeting :

Omori made a discussions of possible time slots of the phone meeting.

Please look at "20111117-Omori_TimeSlot.pdf".

The current time slot is not so convenient for US people. How we can make discussions with US colleagues?

* candidates of the time slots (winter)

| | Japan | Europe | San_Francisco(US) | Chicago(US) |
|-----|-------|--------|-------------------|-------------|
| (a) | 17:00 | 9:00 | 24:00 | 2:00 |
| (b) | 16:00 | 8:00 | 23:00 | 1:00 |
| (c) | 23:00 | 15:00 | 6:00 | 8:00 |
| (d) | 9:00 | 1:00 | 16:00 | 18:00 |

Omori made inquiry in advance to US and Japanese people:

- * Jeff-san prefers (c) followed by (d), (b), (a).
- * Wei Gai-san prefers (c), but (b) might work (He will sleep late).
- * Urakawa-san, Takahashi-san and Omori do not prefer (c).

Sabine-san said that she preferred (a) followed by (b), and (c).

We may have meetings in two slots alternatively?

For examples:

- (a) and (c), or
- (b) and (c)

Omori will make a proposal soon and send it to all.

Reported by T. OMORI

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