

# Summary for the Sources working group

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# Sources working group at ILC2010

as presented and discussed during the preparation meeting with the PM's



## Session 1: Polarized electron source

Session intended to be focused on the status of developments and works done at SLAC, JLAB and Japan related to the polarized electron source.

## Session 2: Undulator based source

Session intended to review and update the ILC-RDR-SB2009 configuration from the helical undulator up to the entrance of the Damping Ring, including issues related to targets, capture and transport of polarized positrons, etc...

## Session 3: Conventional positron sources

Session intended to discuss the possibilities to implement a conventional source for ILC and the expected performance.

## Session 4: Polarized positron sources (Compton, ERL, Linac,É)

Session intended to discuss the possible options to produce polarized positrons.

## Session 5: General discussion

Session intended to summarize the AAP meeting which took place in Oxford in January 2010 and to update (where necessary) the milestones of the NLC-CLIC e<sup>+</sup> generation working group.

# 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 (effects of doping level on the surface)

Slow progress due to limited resources (both manpower and M&S).

Collaboration 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/Nagoaya/Yamaguchi University collaboration)

## BINP: V. Telnov

Proposal RF gun based electron source to suppress the electron Damping Ring

## Session 2: Undulator based source



**Lancaster University (UK): I. Bailey**

Undulator prototype working well apart from heat problem. Magnet field quality mostly excellent (small variations in field at 300 mm intervals cause electron trajectory kinks but will be improved).

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. Waiting for funding to continue studies.

# Session 3: Conventional positron sources including channeling



Strong collaboration between BINP/CERN/Hiroshima/IHEP/IPNL/KEK/LAL

## IPNL: R. Chehab

Hybrid source using channeling is proposed for ILC ( $\Rightarrow$  modification of beam pulse structure  $\Rightarrow$  less energy per pulse on the target  $\Rightarrow$  solutions have been presented to insure a good  $e^+$  yield at IP).

## Hiroshima University: T. Takahashi

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

Parameters space for conventional sources has been revisited  $\Rightarrow$  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 (baseline for the CDR).

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



### BNL: M. Polianskiy

Compton Linac: there is an active CO<sub>2</sub> 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. There is not enough available resources to study all the schemes.

### 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,...)

### 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 collaborations)

## Session 5: General discussion



### Rotation targets: **T. Omori**

Learning from SLC and NLC experiences, several options have been considered and possible risks have been explored.

### 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.