

## Minutes of the 6th Euro-Japan Compton capture&stacking meeting

Date: February 18th 17:00(JST) 9:00 (CET), 2008

A part of Attendees (whom Omori was able to hear the voices):  
Vivoli(LAL), Chehab(LAL), Eugene(NSC-KIPT), Louis(CERN),  
Frank(CERN), Vitaly(BNL), Takahashi(Hiroshima),  
Kuriki(Hiroshima), Kamitani(KEK), Urakawa(KEK), and Omori(KEK)

### Agenda:

1. Comparison between "6Jx1CP" and "0.6Jx10CPs" : Omori
2. Comparison of Capture Simulations : Omori
3. Capture simulation update : Vivoli-san
4. Stacking simulation update : Frank-san
5. Source to DR optimization : Vitaly-san
6. Expected topics in the next GDE meeting in March : Omori
7. Discussions

### Presentations:

T.Omori: Comparison between "6Jx1CP" and "0.6Jx10CPs"  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori\\_06Jx01vs60Jx01vd06Jx10.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori_06Jx01vs60Jx01vd06Jx10.pdf)

T.Omori: Comparison of Capture Simulations  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori\\_CompCapSim.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori_CompCapSim.pdf)

A. Vivoli: Capture Simulation Update  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Vivoli\\_Capture.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Vivoli_Capture.pdf)

F. Zimmermann: Staking Simulation Update  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Frank\\_StackingSimulations.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Frank_StackingSimulations.pdf)

V. Yakimenko: Source to DR optimization  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Yakimenko\\_SourceDRoptimization.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Yakimenko_SourceDRoptimization.pdf)

T.Omori: Expected topics in the next GDE meeting in March  
[http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori\\_TohokuGDE.pdf](http://www-jlc.kek.jp/~omori/EuroJapanMeeting/20080218/20080218-Omori_TohokuGDE.pdf)

### Summary of the discussions:

1. Comparison between "6Jx1CP" and "0.6Jx10CPs"

Please see 20080218-Omori\_06Jx01vs60Jx01vd06Jx10.pdf.

Omori made comparison between "0.6Jx1CP", "6Jx1CP", and "0.6Jx10CPs".

In the viewpoint of the energy distribution of produced gamma-rays, "0.6Jx1CP" and "6Jx1CP" were quite different. The "0.6Jx1CP" had clean distribution in which the 1st harmonic was dominated. The gamma-ray distribution in the "6Jx1CP" was very much affected by higher harmonics. On the other hand, the energy distribution in the "0.6Jx10CPs" was very similar to that in the "0.6Jx1CP".

In the viewpoint of the energy distribution of the electron beam after collision(s), "6Jx1CP" and "0.6Jx10CPs" were similar.

## 2. Comparison of Capture Simulations

Omori made update of the comparison of three simulations:

- (a) Vivoli-san 1 : Vivoli-san's presentation in Posipol 2007  
"A\_Positron\_Capture\_for\_the\_Compton\_Scheme.ppt"
- (b) Vivoli-san 2 : Vivoli-san's recent report  
"RESULTS OF PARMELA SIMULATIONS OF THE CAPTURE SECTION WITH PHOTONS FROM 10 LASER CAVITIES"  
See Vivoli20071113c.pdf
- (c) Wanming-san : Wanming-san's recent report  
"Capture under different target and Pz lower cut.ppt".

In the old table, '20071220-Omori\_CompCapSim.pdf', the distance between the target and the AMD in (c) was 0.5 m. It seemed too big. Omori contacted Wanming-san and confirmed that the distance (0.5m) in the old table was wrong. This was Omori's mistake. The correct value value of the distance was 0 m.

Omori made the corrected table '20080218-Omori\_CompCapSim.pdf'

## 3. Capture simulation update

Please see 20080218-Vivoli\_Capture.pdf

Vivoli-san explained the progress of the capture simulation. He made 2 new studies.

One was comparison of different target thicknesses. He compared results of 0.3X0, 0.4X0, and 0.5X0.  
( $E_e = 1.3$  GeV)

There were small difference in yields and transverse emittances. But the differences were within 10-20 %. There was no big difference.

Second was comparison of different bunch compressions.  
( $E_e = 1.8$  GeV)

This study showed that we had large flexibility (factor 2 - 3) in choosing the combination of sig\_E and sig\_Z.

#### 4. Stacking simulation update

Please see [20080218-Frank\\_StackingSimulations.pdf](#).

Frank-san made a big table of comparison between four damping rings in view point of the stacking. Those damping rings were, "ILC-DR Snoemass05 (3 km DR in Snowmass 2005 Compton proposal)", "ILC2008 (RDR DR)", "pre-DR for CLIC (actually NLC 2004 design)", and "pre-DR for CLIC with higher Vrf".

He also made stacking simulation of ILC2008. The results showed that stacking loss was 76 %. This value was much worse than the value in Snowmass 2005 (stacking loss was 18 % in Snowmass report). In ILC2008, assumed bucket area was 2 times smaller than that in Snowmass. Also assumed number of stacking in ILC2008 was three times larger than that in Snowmass. Those differences may cause the worse results in ILC2008. Chehab-san suggested to make energy compression before DR. The energy compression may improve the stacking.

Omori pointed that the Frank-san's scheme (inject 30 times into the same bucket; then wait 10 ms) is suitable for a Compton ring but not suitable for an ERL. Since an ERL requires CW operation, the "10 ms wait" is not suitable to an ERL.

#### 5. Source to DR optimization

Please see [20080218-Yakimenko\\_SourceDROptimization.pdf](#).

Vitaly-san discussed an overall optimization through gamma-ray generation to DR.

He discussed the gamma-ray spot sizes on a target and the positron beam sizes at the exit of the target in the three schemes : Undulator, Linac Compton, and Ring Compton.

He compared the DR acceptance and the emittance of the captured positrons in the three schemes.

He compared a stationary target and a rotation target. A stationary target can be cooled from side. This is an advantage of a stationary target.

He discussed the relation between the capture efficiency and the gamma-ray spot size. He also discussed the relation between the capture efficiency and operation mode of the RF in capture section (CW or pulse)

#### 6. Expected topics in the next GDE meeting in March

Please see [20080218-Omori\\_TohokuGDE.pdf](#).

Omori explained the agenda of the GDE meeting in March (at Sendai, Tohoku) which was under discussion in the GDE EC and PMs.

In the March meeting, GDE EC and PMs decided to concentrate four issues. Those four issues were,

"WG-1: Cost Reduction Studies",

"WG-2: SRF (including ATF2)",

"WG-3: BDS / MDI", and

"WG-4: DR (including ATF)".

This means that there will be no e+ WS and no e+ sessions.

Omori proposed that we only report our ATF activities (the experiments with 2-mirror cavity and the 4-mirror cavity) in ATF session. Omori will goto Tohoku and make presentation.

The date of the next meeting is 10th March,  
17:00 JST (9:00 CET).

Reported by T. OMORI