Review of Nanobeam-2005

October 17-21, 2005, UJi, Kyoto, Japan

(1) Laserwire mini-workshop

(2) Linear Colliders (ILC and CLIC)

(a) BDS-design and interaction region

(b) stabilization and beam control

(c) Future R&D Plans

(d) Final Focus Q-magnet

(3) Advanced Beam Science

(a) Low emittance sources

(b) FELs and radiation source

(c) Other sources

(4) Physics with High Intensity Laser Beam

Participants of Nanobeam 2005

(Japan : 63) Asia : 66, EU : 23, USA : 15, Total : 104

Nanobeam2008 at BINP.

Real landscape at Nanobeam2002 :The chateau of Gruyere.

Real landscape at Nanobeam2005 : the Byodoin of Uji.

Highlights of Plenary Talks

- Summary of Nanobeam 2002 and Expectation
–'Stability and Ground Motion Issues in CLIC' **by F. Zimmermann**
- Status of the ILC by K.Yokoya
- Issues on Stability and Ground Motion in ILC by A.Seryi
- Test Beams for ILC Final Focus by G.Blair
- **Frontiers of Light Source by T.Yamazaki**
- The "Stabilization of the Final Focus of the ILC" Project by D.Urner
- Electron Microscope as a Nano-Beam Analyzer by S.Isoda et al.
- Frontiers of high energy physics at LHC and ILC by H.Murayama
- Nanomaterial and its Medical Use: Smart Polymeric Micelles for Gene and drug Delivery by K.Kataoka
- Study of Cellular Radiation Response Using Heavy-Ion Microbeams by Y.Kobayashi
- Microbeam System for Heavy Ions from Cyclotron to Irradiate Living Cells by W.Yokota et al.
- **Stabilization of Stored Beam in the Spring-8 Storage Ring by H.Tanaka**

2002-LC

Figure 26: Collider landscape at Nanobeam'02: in 2002 three or four linear-collider projects were proposed, namely TESLA, NLC/JLC, and CLIC; the collider names are scaled with the rf wavelength. Some pictures were taken from [9].

2005-LC

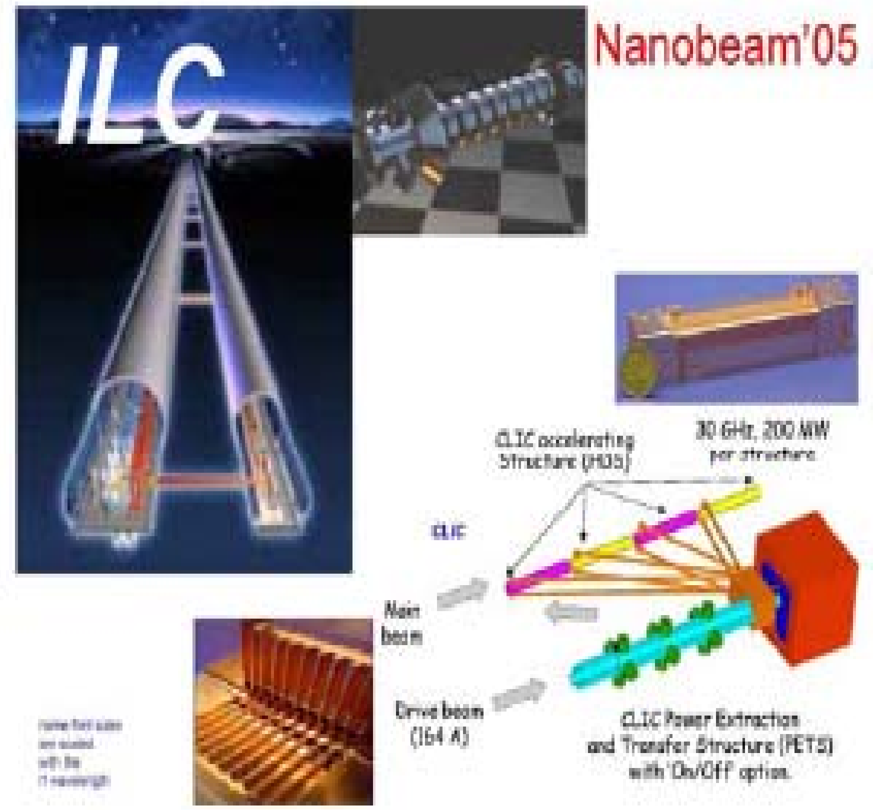
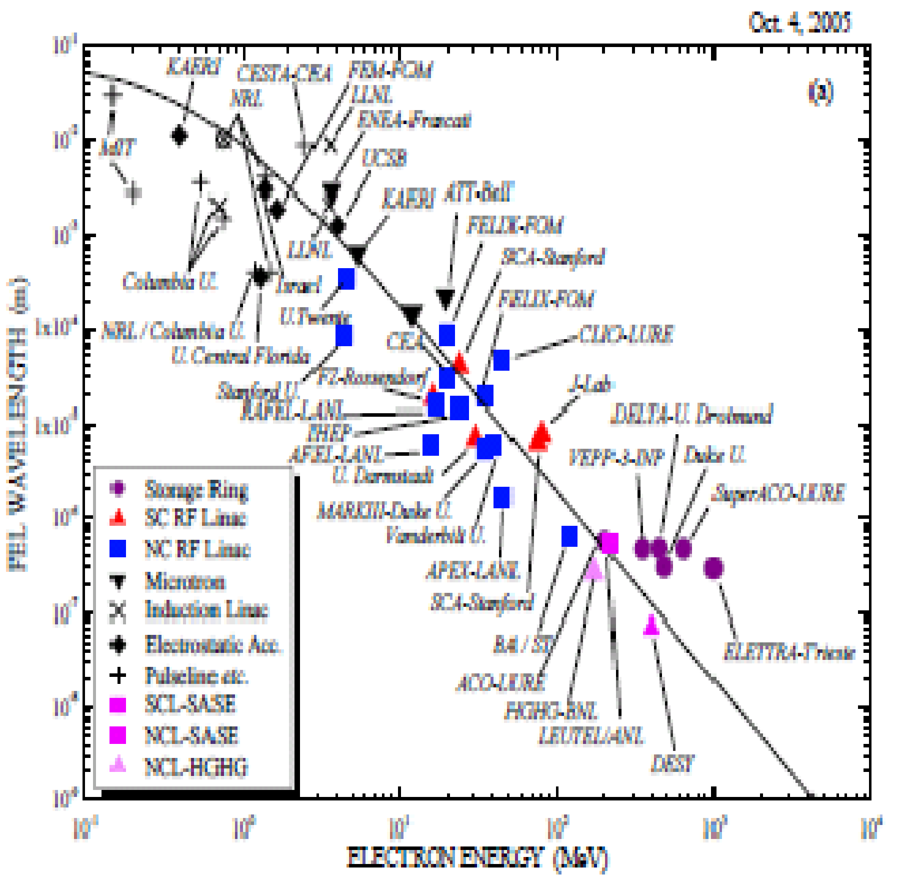


Figure 27: Collider landscape at Nanobeam'05: in 2005 only CLIC remains from the 2002 contenders and there is as a new player the ILC; the collider names are again scaled with the rf wavelength.

FEL projects in the world



ERL Scheme

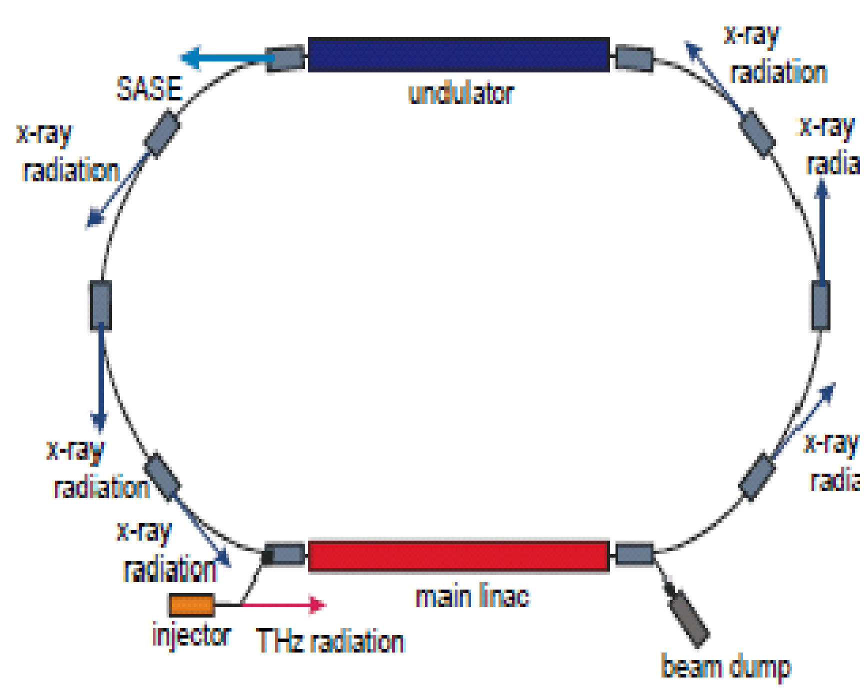


Figure 7 An example of ERL scheme.

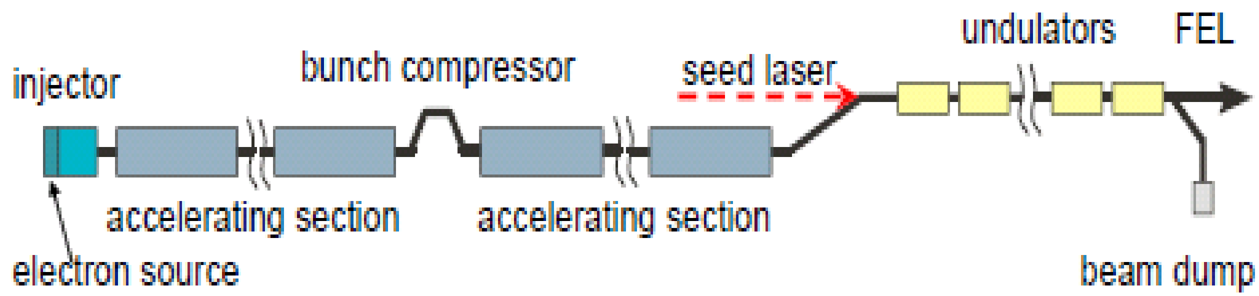


Figure 3. Typical SASE and HGHG scheme.

From STABILIZATION OF STORED BEAM IN THE SPRING-8 STORAGE RING

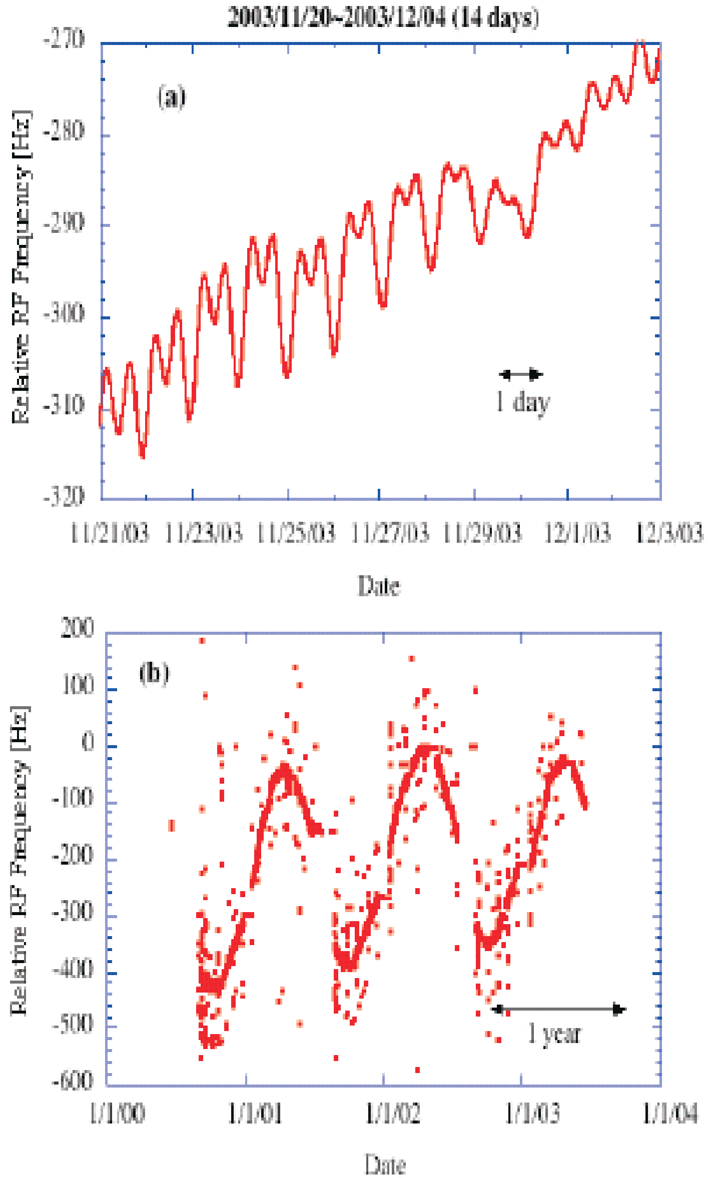


Figure 5: Observed RF frequency variation in keeping the store beam energy constant. Figure 4(a) shows the short-term change (6 days) clearly showing the circumference change by tidal movement and Figure 4(b) shows the seasoning change for about three years.

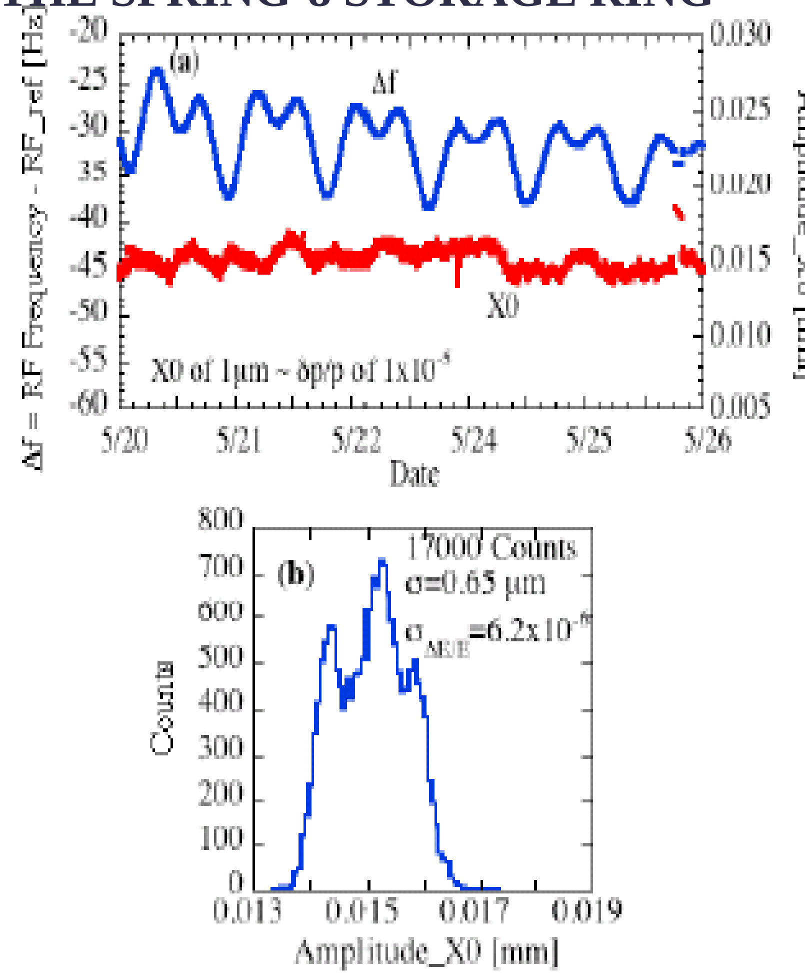


Figure 17: Typical energy stability for the user operation over 5 days. Fig. 17(a) shows changes of RF frequency and amplitude of DC component of COD measured by about 280 BPMs. The amplitude of 1 μ m corresponds to $1x10^{-5}$ by δp/p. Fig. 17(b) shows statistical distribution of the measured amplitudes of DC component in Fig. 17(a).

Highlights of Working Groups Summaries

Summary of Laser-wire Mini Workshop (WG1) *G.A. Blair*

WG2a Summary *A.Seryi*

WG2b Summary *P.Burrows*

WG2c Summary *M.Ross*

WG2d Summary *B.Parker*

WG3a Summary: Low Emittance Sources

J.E.Clendenin, J.W.Lewellen, K.Masuda, F.Stephan

WG3b Summary: FEL-Radiation Sources

H.Ohgaki, M.E.Couprie, G.Kulipanov

WG3c-1 Summary : Lepton Beam *Y.Uk Jeong*

WG4 Summary : Physics with High Intensity Lasers

T.Takahashi

Low Emittance Electron Guns

1. SC RF Guns

The guns being developed range from hybrids in which the cathodeis NC, to all-Nb SC cavities.

Cathode materials that are being studied include Cs2Te, Pb and CsKSb/diamond as well as Nb.

2. 1.6-cell S-band RF Gun

Ultra-Low Emittance,

Ultra-Short Bunch Length

3. Polarized Photocathodes

4. Thermionic RF Gun with Independently Tunable Cells

5. DC thermionic gun

One of FEL-RADIATION SOURCES

Table.2 Comparison of parameters of SR sources MARS (Ie=2.5 mA) and Spring-8 (Ie=100 mA)

		Number of beam-lines	Brightness (ph/sec/mm^2/sr) $\Delta\lambda/\lambda=10^{-3}$	Flux (ph/sec) $\Delta\lambda/\lambda=10^{-3}$
MARS	U,Nu-10^2	48	10^{22}	4.6×10^{13}
	U,Nu-10^3	12	10^{23}	4.6×10^{14}
	U,Nu-10^4	4	10^{24}	4.6×10^{15}
Spring-8	Bending	23	10^{16}	10^{15}
	U,Nu-130	34	3×10^{20}	2×10^{15}
	U,Nu-780	4	10^{21}	1.2×10^{16}

U:Undulator, Nu:number of period

From "Comparison of one pass(ERL) And multi pass accelerators-recuperators(MARS) as coherent X-ray sources"

As my talk summary for Nanobeam2008 Workshop:

Nanobeam is essential not only for ILC and CLIC but also for FEL, ERL, many applications and high field physics.

Nanobeam requests us to stabilize the beam orbit within nanometer level.

Thank you for your attention.