STF accelerator status
(RFgun + capture cryomodule operation)

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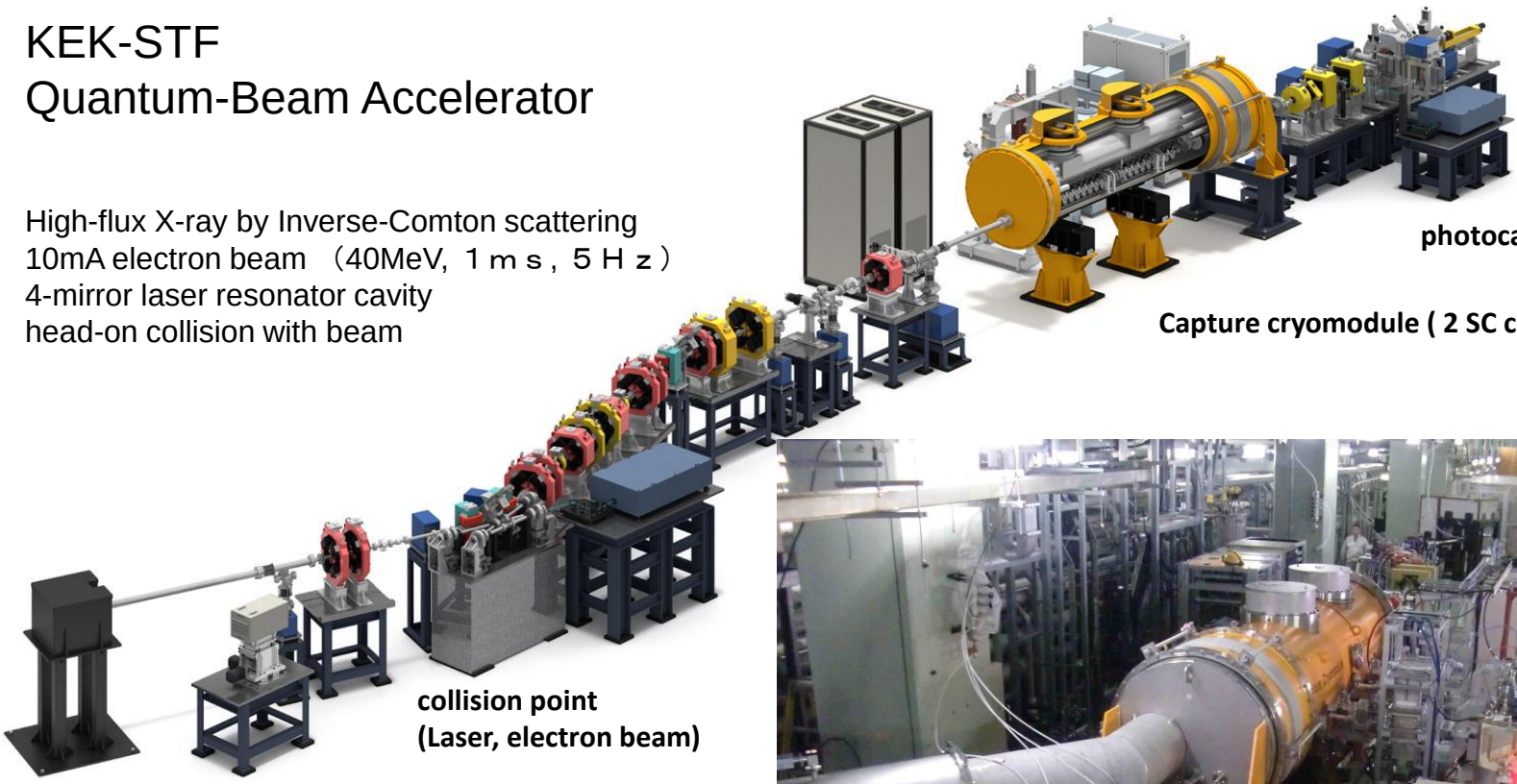
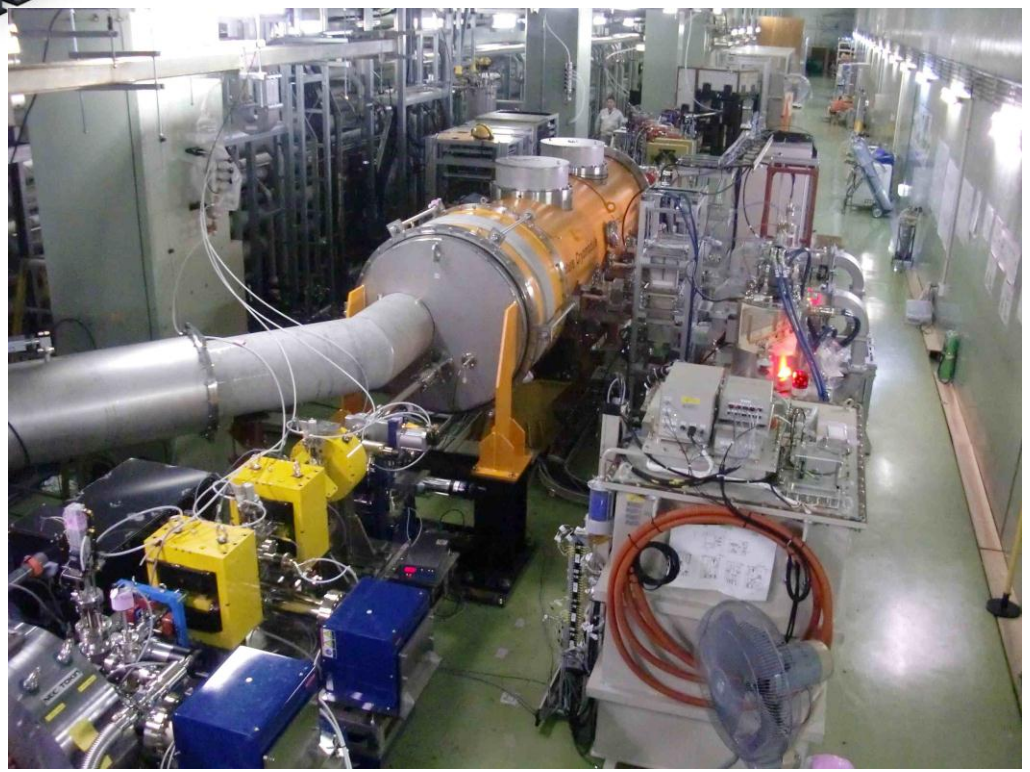
STF Quantum-Beam experiment

KEK-STF
Quantum-Beam Accelerator

High-flux X-ray by Inverse-Comton scattering
10mA electron beam （40MeV, １ｍｓ, ５Ｈｚ）
4-mirror laser resonator cavity
head-on collision with beam



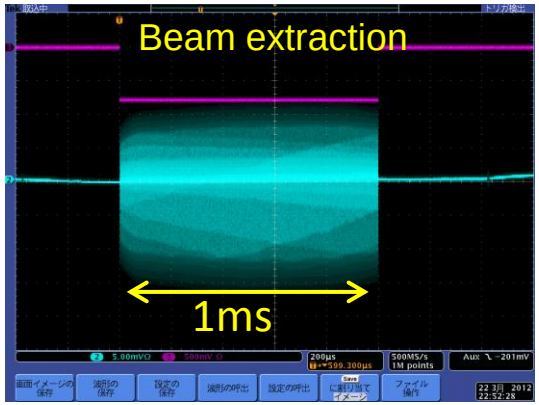


Target: 1.3 x 10^{10} photons/sec 1%bandwidth

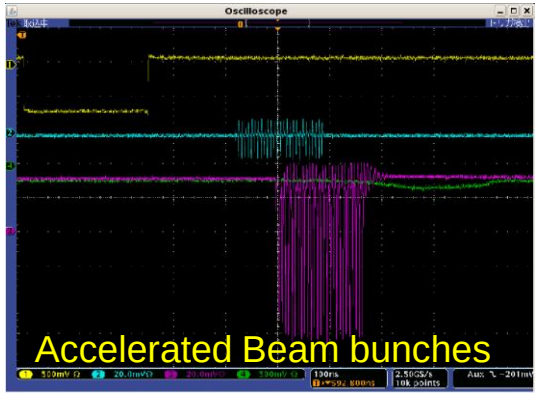
2012. Feb : cool-down started,
April-June : beam acceleration

STF QB accelerator commissioning (April-June 2012)

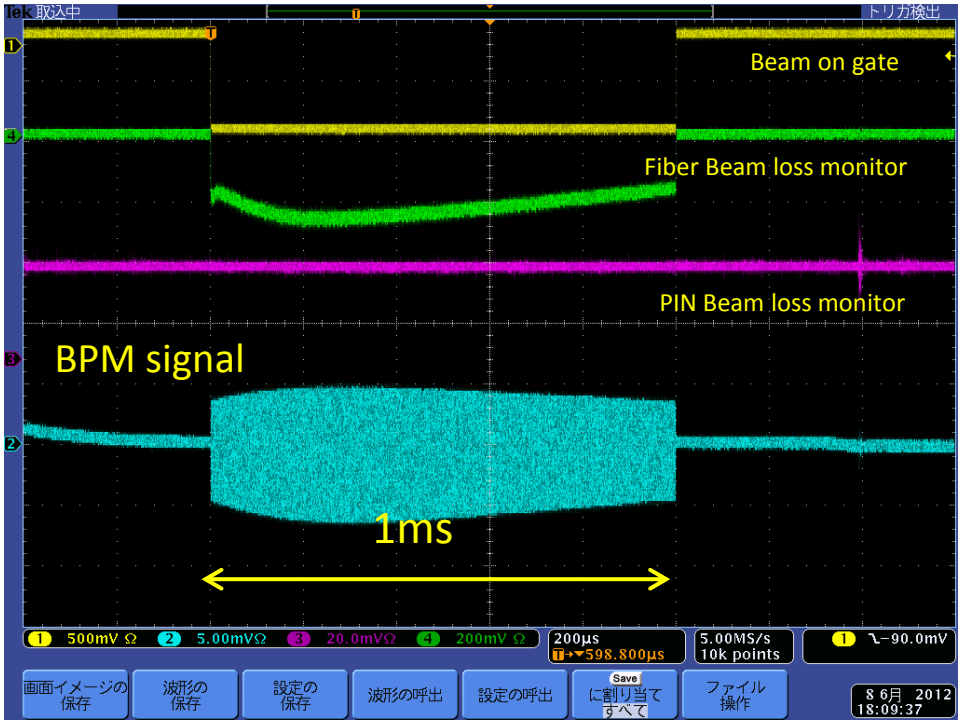
Accelerator commissioning for beam extraction, acceleration, and 1ms beam



1ms Beam extraction from RF-gun (Mar.22,2012)

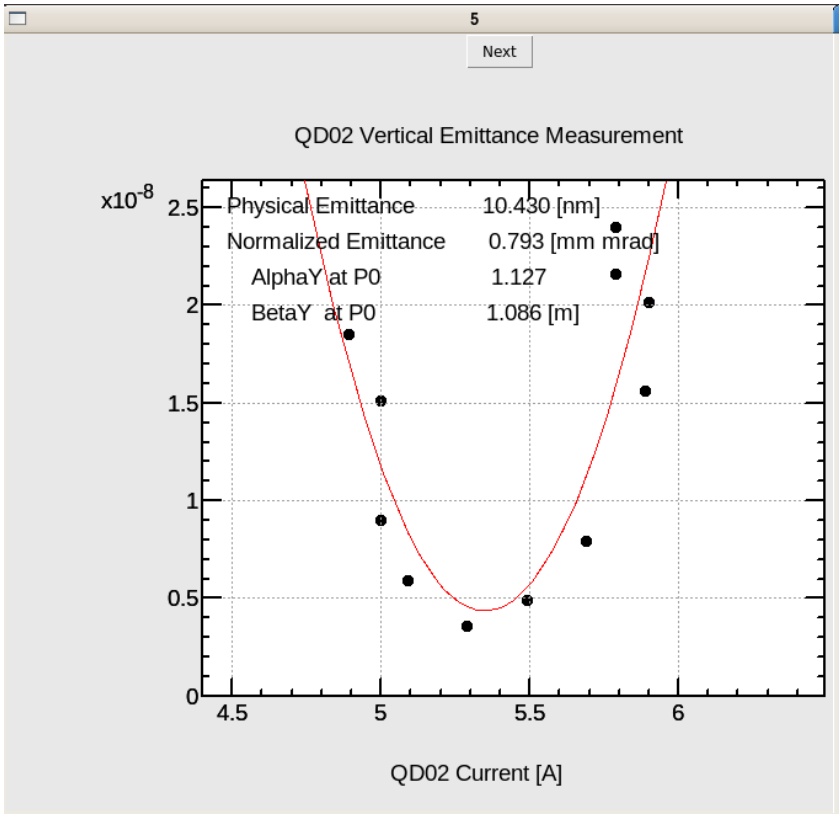


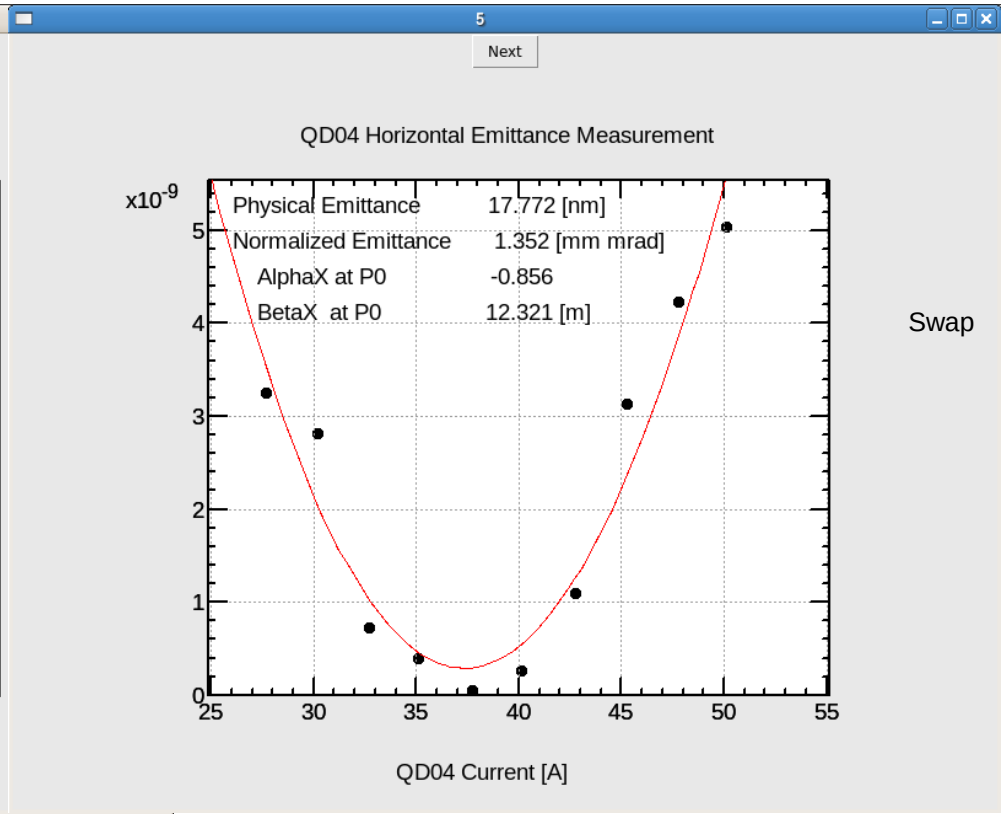
beam acceleration
40MeV, 41pC/bunch, 28bunches（April, 2012）



20% of full-beam power operation
40MeV, 15pC/bunch, 162500bunches
（June, 2012）
—＞ILC beam（1ms length）acceleration
ILC beam intensity（6.6mA)

Beam emittance of STF accelerator





Swap

Date	Normalized Emittance [mm mrad]		RF gun [MW]	SC cav. [MV/m]	Main Solenoid : Main/Backing	UV Laser	Charge [pC]	Energy [MeV/C]
	Vertical	Horizontal						
13/June	0.79	1.3	3.5	14.5, 24.0	306.23 / 100.73	φ1mm	15-25	39.1

ε_x, ε_y : 0.8 – 1.3 x 10^{-6} @ 15-25pC/bunch, 39MeV（close to the design）

Beam size measurement June 21,2012

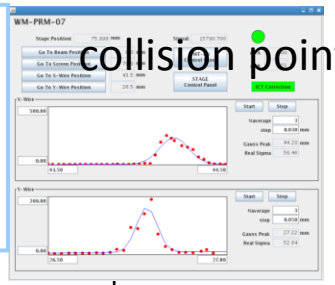
RF gun 3.5 MW, SC cav 14.5 & 25.5 MV/m

40 MeV, 35 - 40 pC, 40 bunches

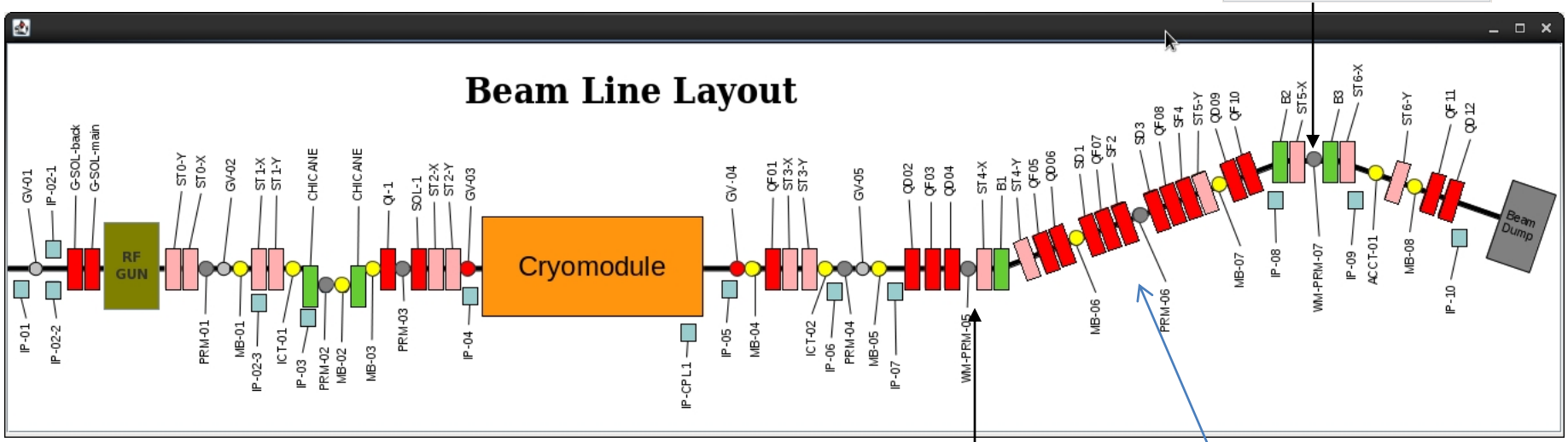
Second wire scanner

σ_x : 56.5 μm

σ_y : 52.6 μm



collision point



First Wire scanner:

σ_x : 22.8 μm

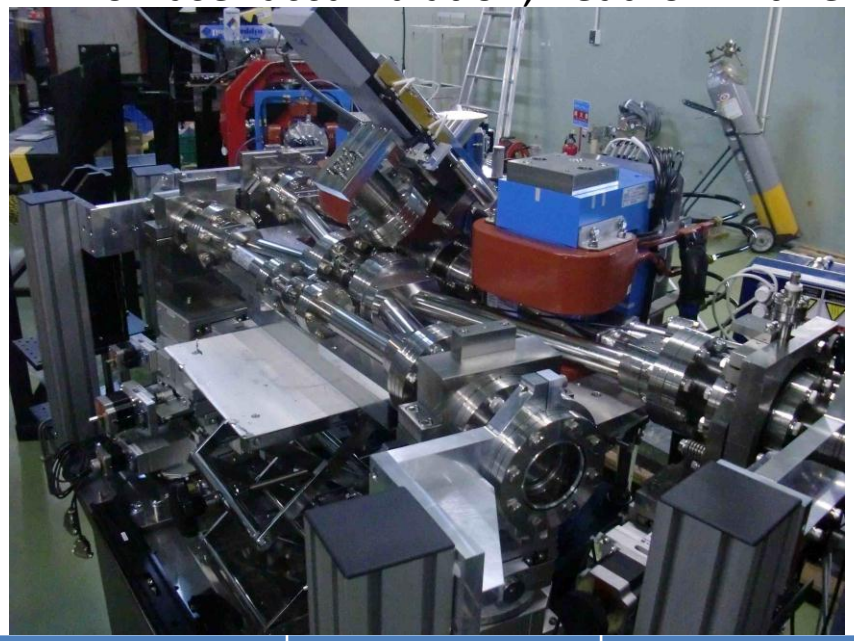
σ_y : 21.3 μm

Still beam line Tuning is necessary

Plan of X-ray generation by Inverse-compton scattering

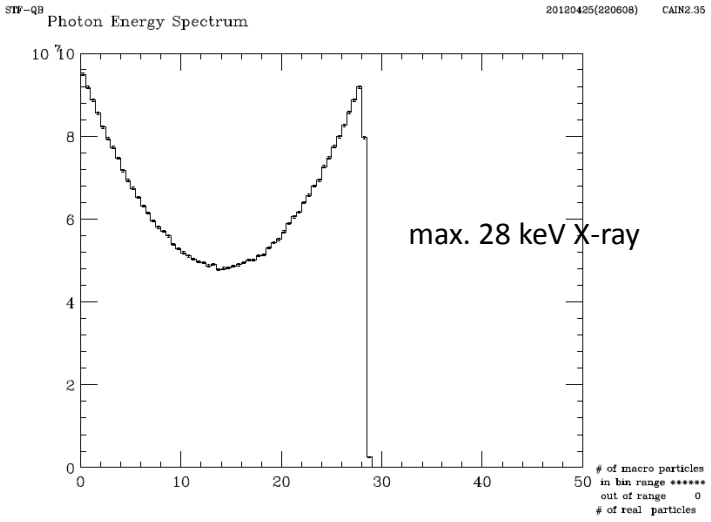
collision will be started in September

4-mirror laser accumulation, head-on with e-beam

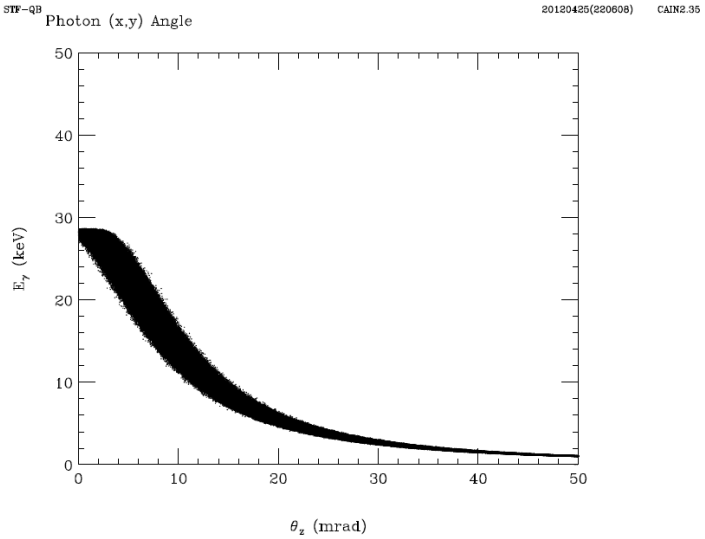


	Electron	Laser
Energy	40MeV	1.17eV (λ=1064nm)
Energy spread	0.1% (rms)	
Beam size(rms)	10μm	10μm
Pulse width(FWHM)	12ps	12ps
Intensity	61.5 pC/bunch	50mJ/pulse
Number of bunches	162500	----
Emittance	0.5π mm mrad	
Collision angle	0deg (Head on)	
Rep. Rate	5Hz	

40MeV, head-on collision



max. 28 keV X-ray



target: 1.3×10^{10} photons/sec/1%bw