Accelerator R&D at KNU

18 March 2008
@ KNU-ATF collaboration meeting

KNU
Eun-San Kim


Incheon
Seoul
Daejeon
Pohang
Daegu
Kwangju
Busan
Pusan
Fukuoka
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Pointer 35°48'25.65" N 128°12'30.42" E elev 1079 ft
Streaming 100%

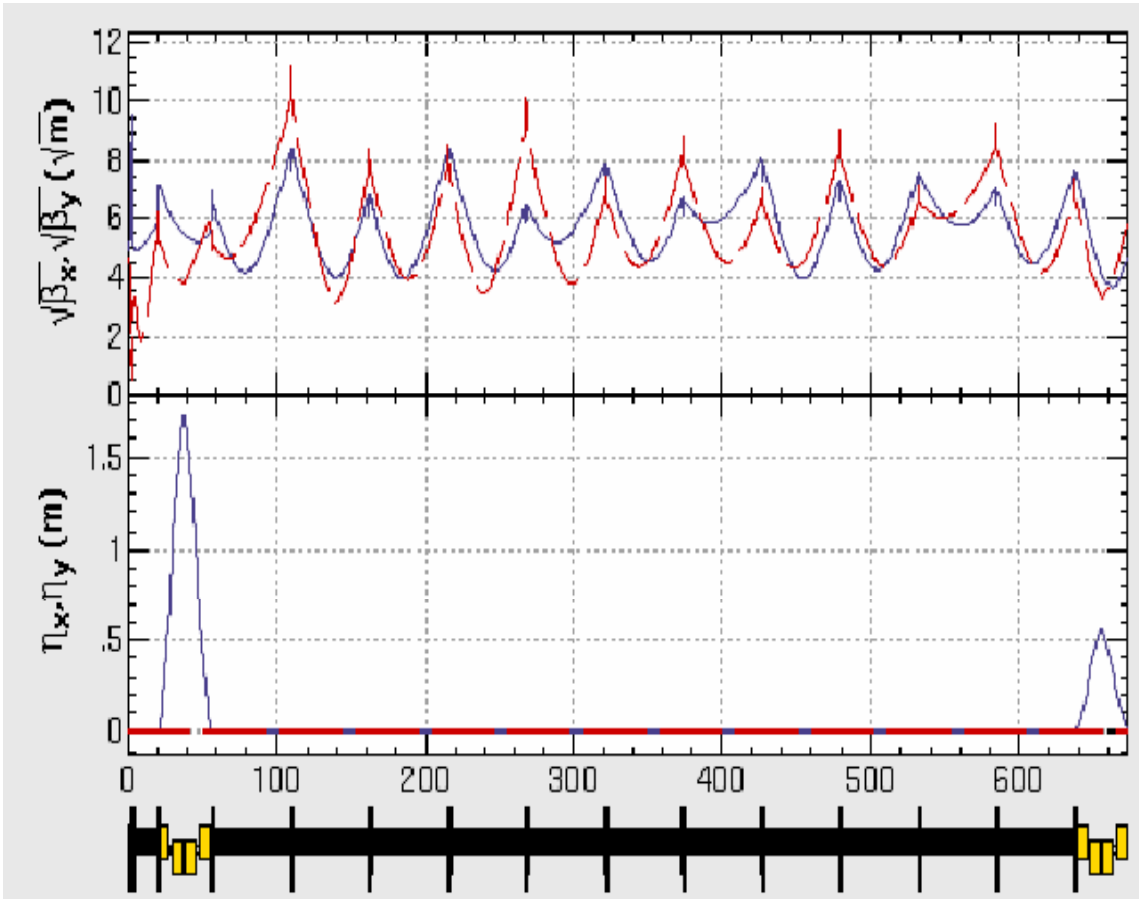
Contents

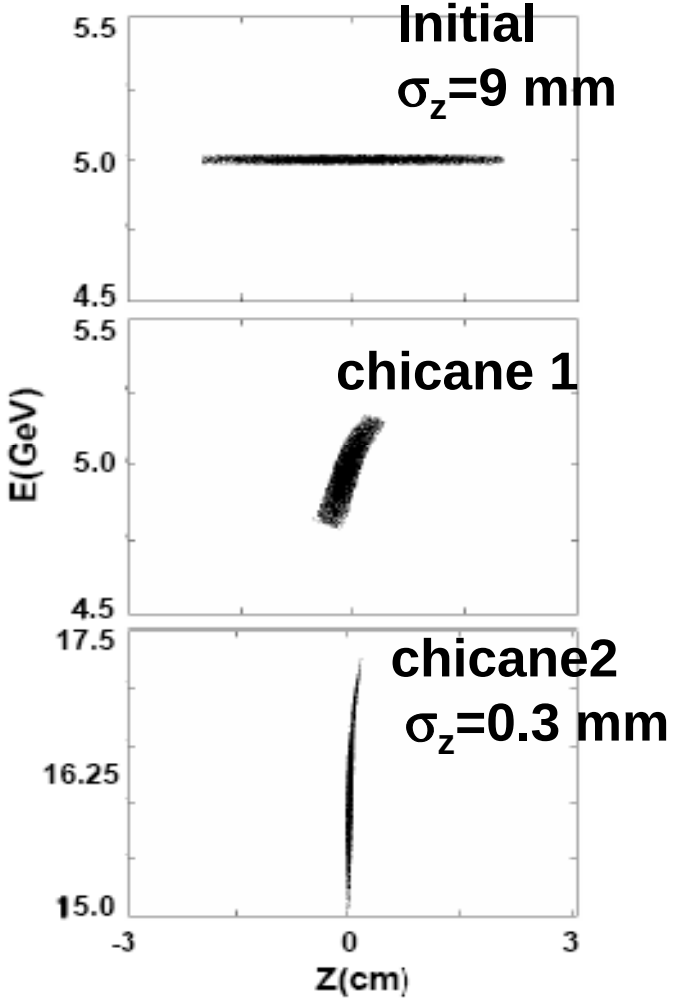
- R&D for ILC

- R&D for domestic Accelerators
  - Upgrade for PLS
  - Design for 2 GeV PS

Alternative bunch compressor

- **Lattice design and beam tracking**



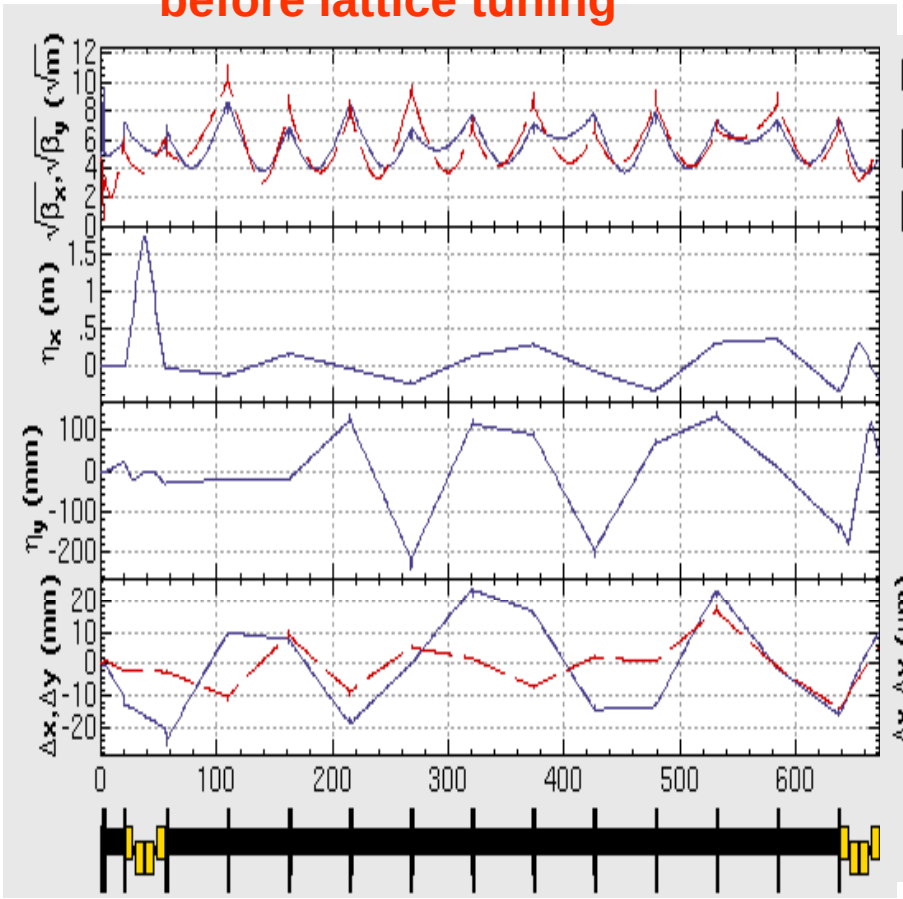


For cost down

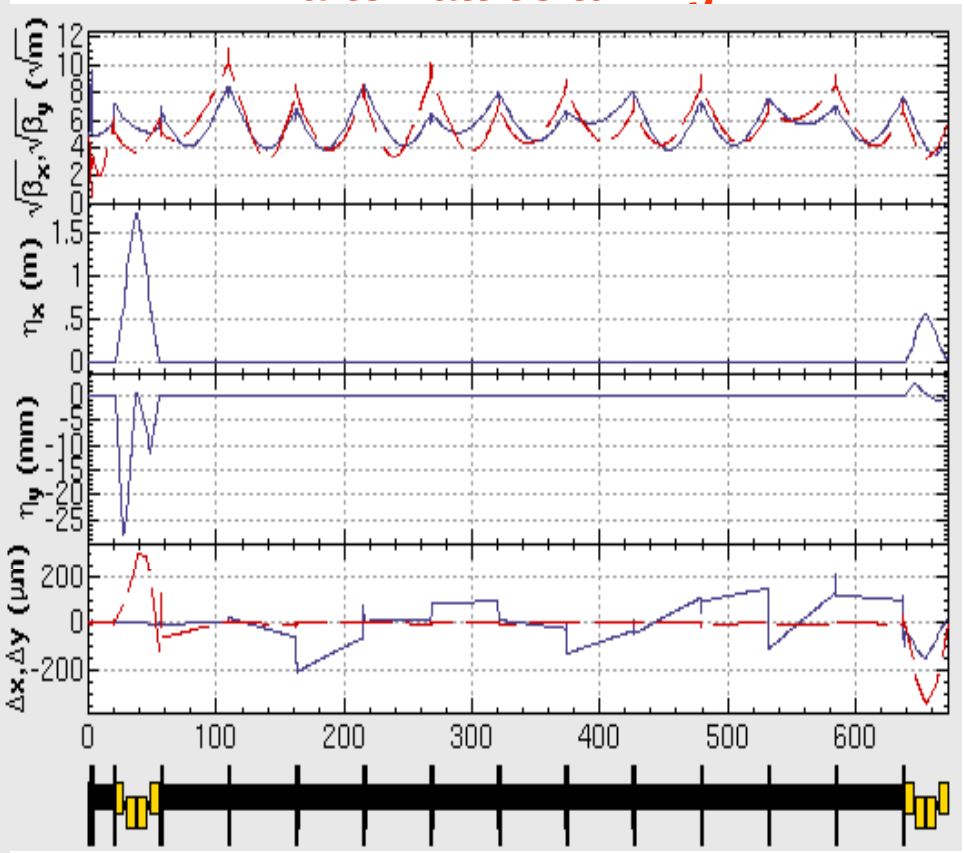
Alternative bunch compressor

❑ Lattice tuning

before lattice tuning

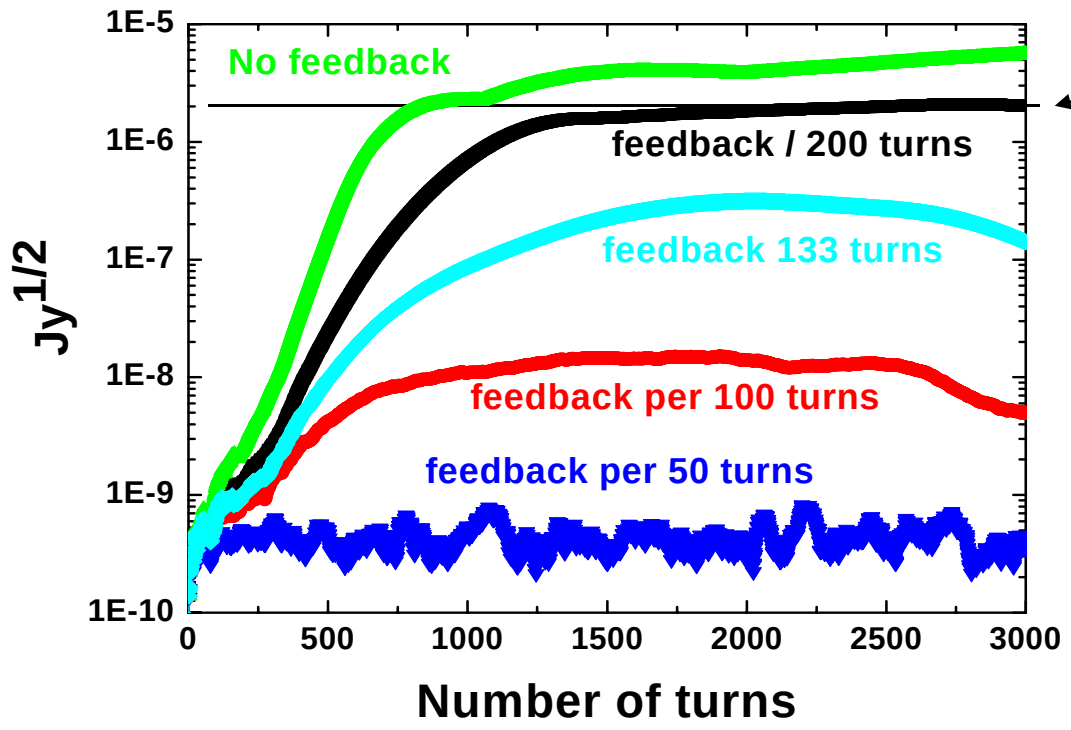


after lattice tuning



Damping ring

❑ Fast-ion instability in FODO4 and OCS8



Vertical beam size

Bunch intensity : 0.97x10^{10}

Number of bunch per train : 49

Gap between train : 25

Bunch spacing in a bunch : 2

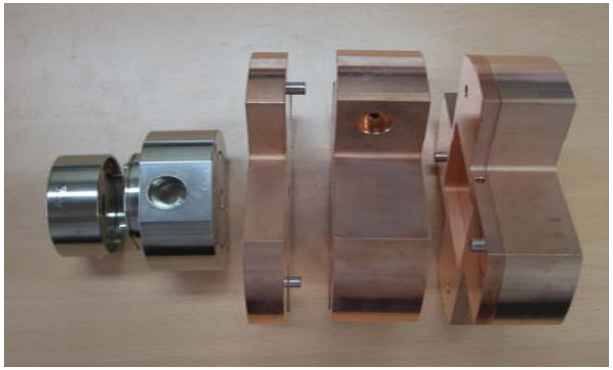
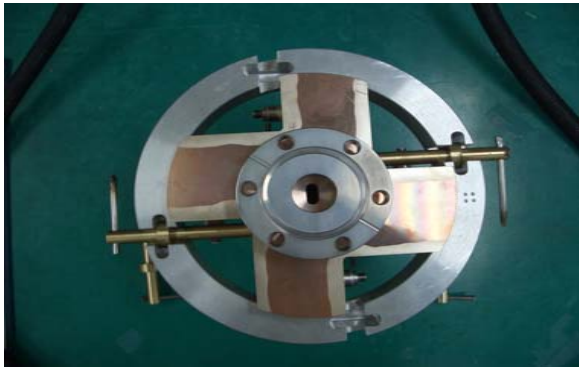
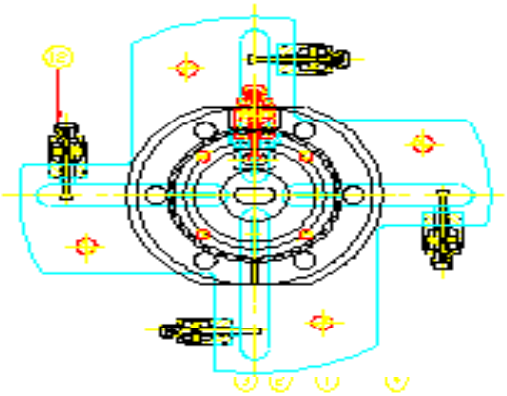
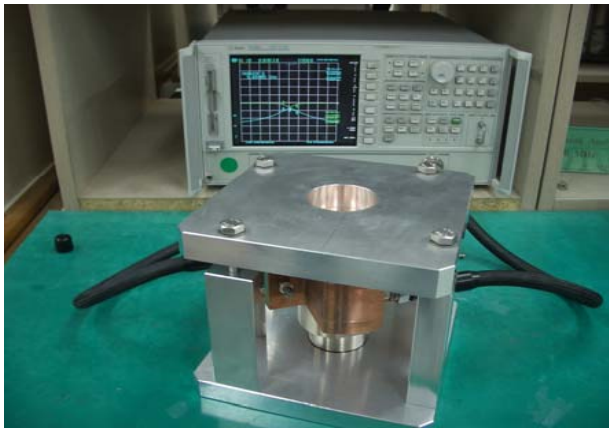
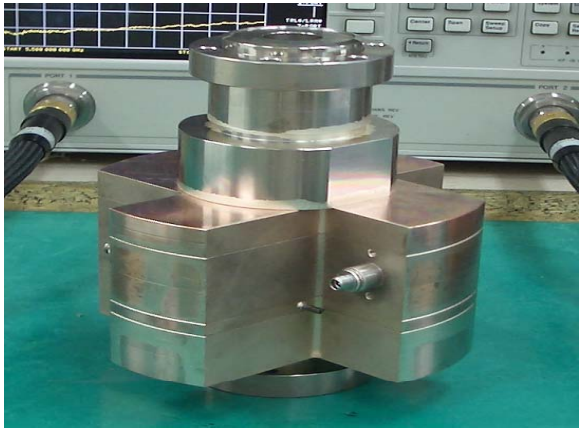
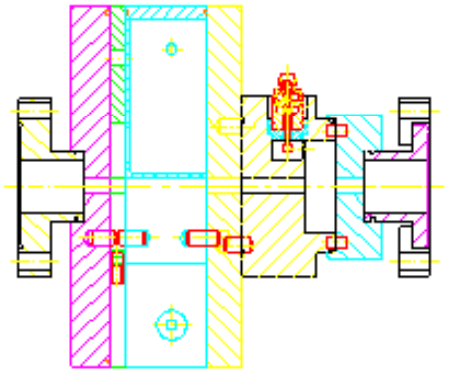
Vacuum pressure : 0.23 nT

Growth time : ~ 90 turns

- ❑ **Lattice studies for larger dynamic aperture with Y. Peng (planned)**
- ❑ **Ecloud simulations with K. Ohmi (by Graduate student)**

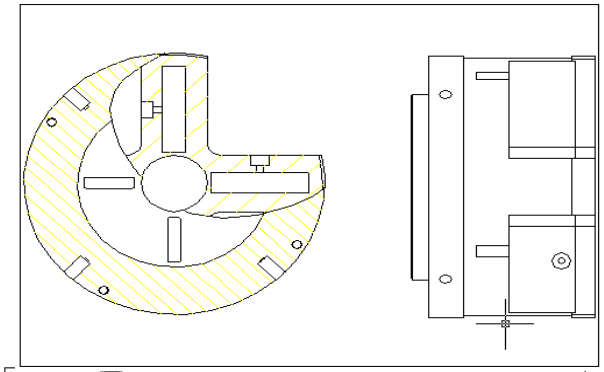
BPMs for ATF2

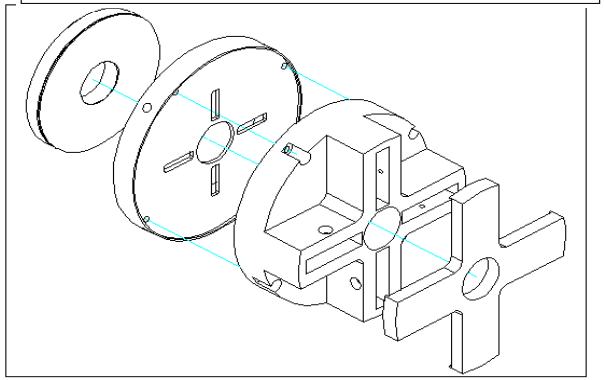
- **Low-Q IP-BPM**

BPMs for ATF2

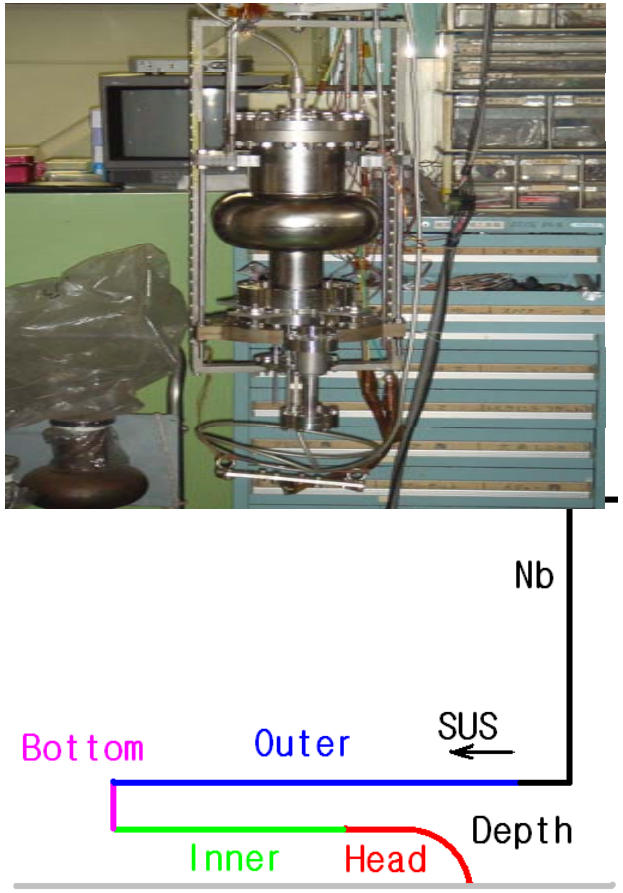
- **Low-Q S-BPM**

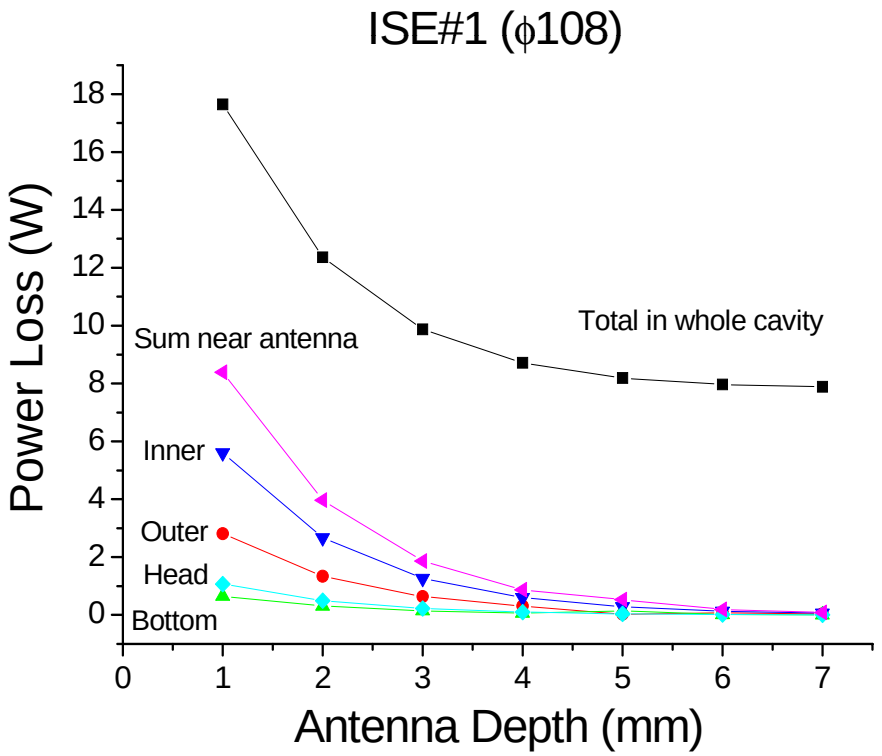




ICHIRO Cavity

- Analysis on power loss during measurement
- Analysis on Multipacting effects





IOT

Design of Horizontal IOT

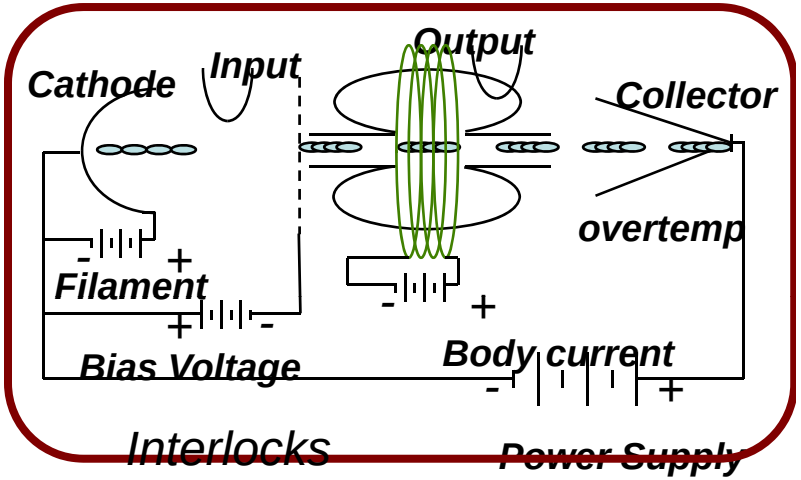
Pros.

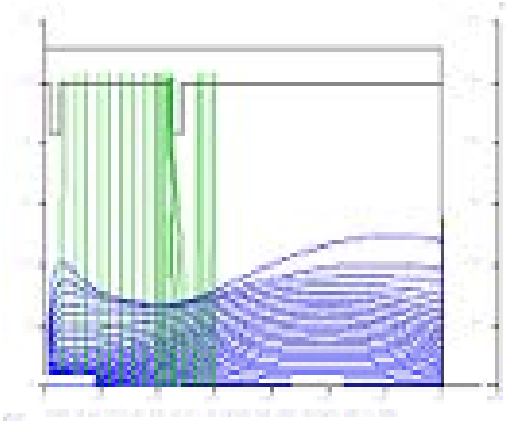
- easy installation
- low cost
- economic maintenability
- no expensive modulator

Design Specifications

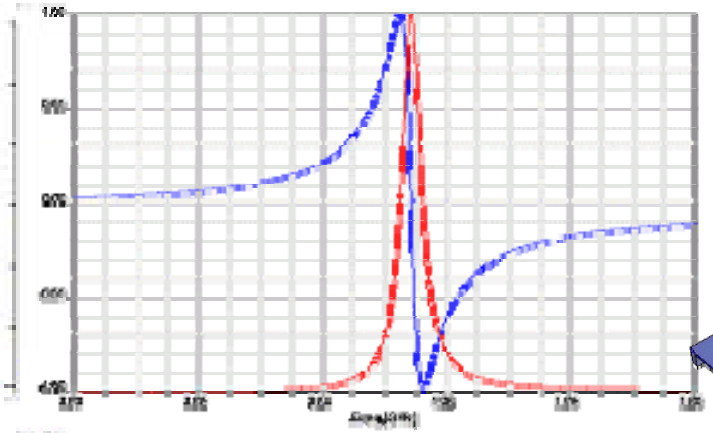
Beam Voltage	55	kV (nom)
Beam Current	123	A (nom)
Frequency	1.3	GHz
Gain	-	dB (min)
Efficiency	~70	% (nom)
Cathode Loading	<1.0	A/cm2

Schematics of IOT

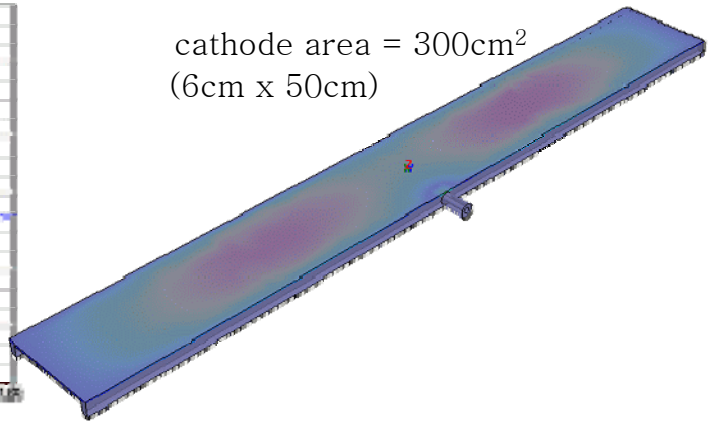




Electron Gun



resonance frequency

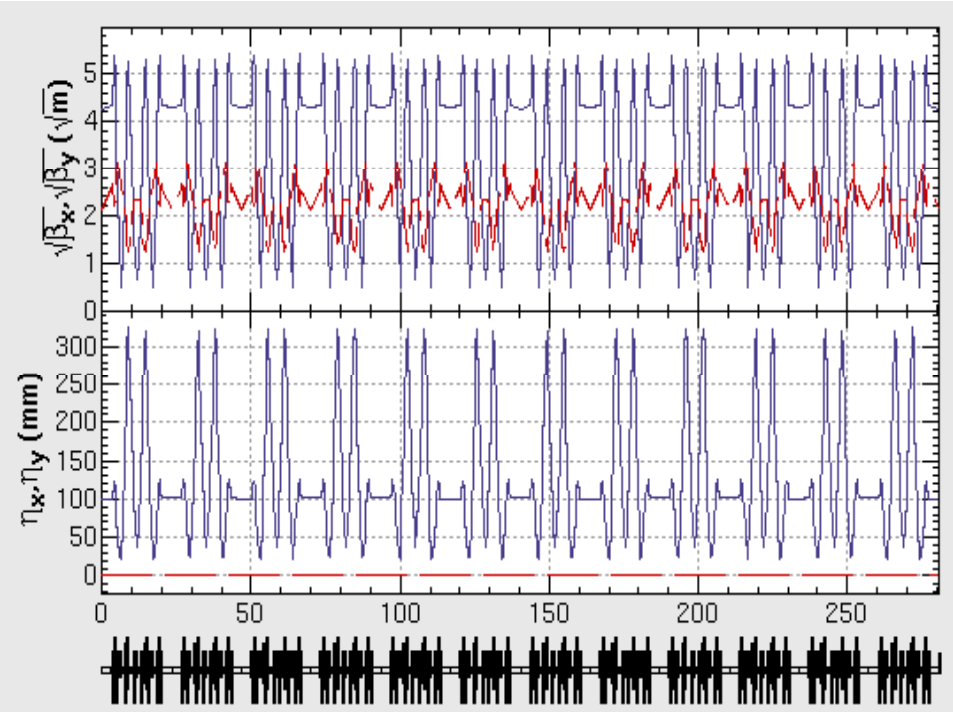


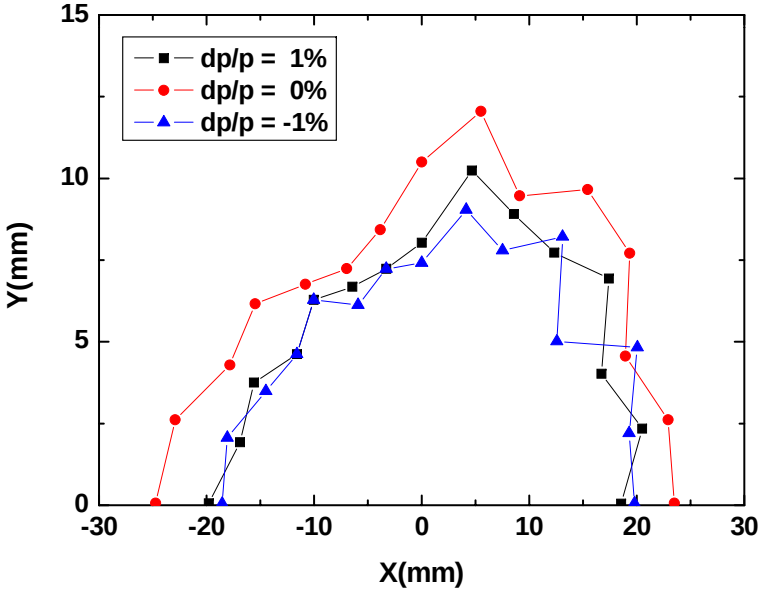
interaction cavity

Design R&D for domestic accelerators

Lattice for 3 GeV PLS

Lattice of 5.3 nm

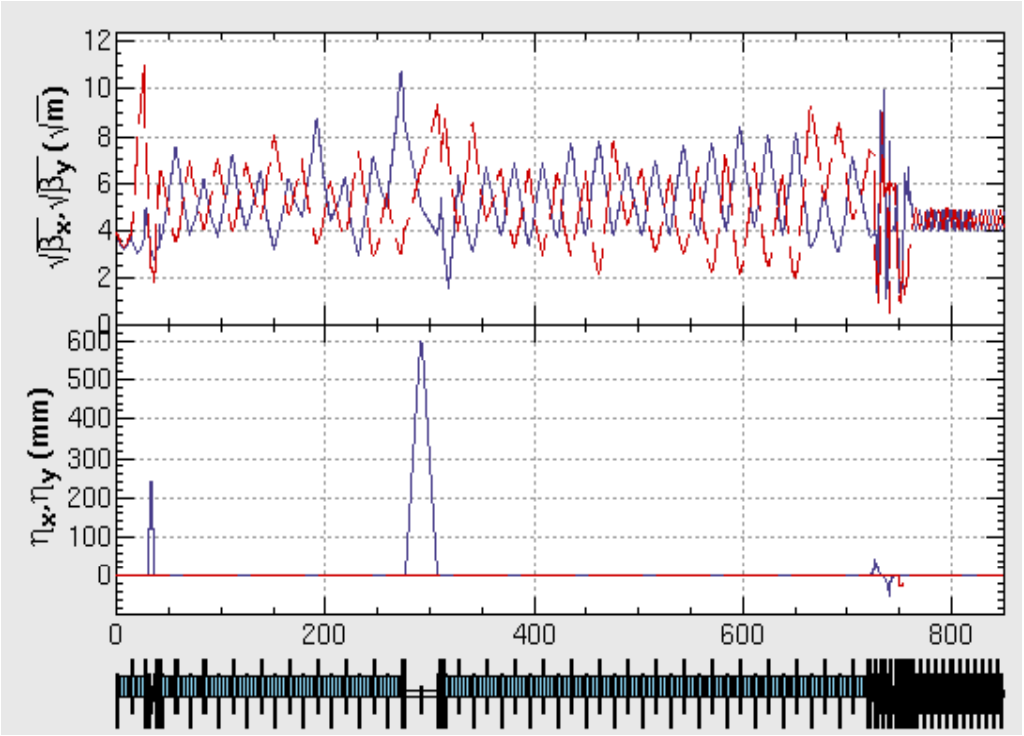


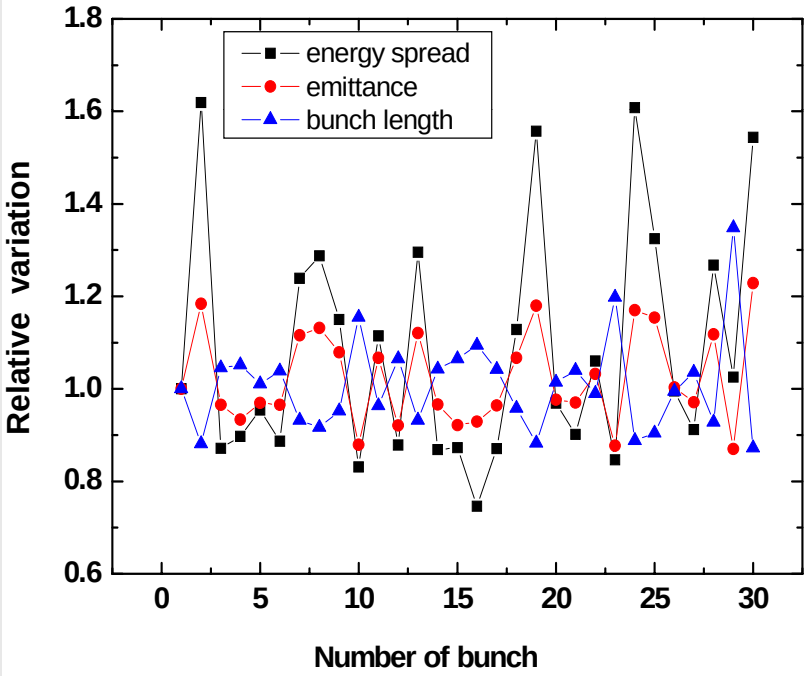


Dynamic aperture with machine errors

Present lattice 18.9 nm @ 2.5 GeV

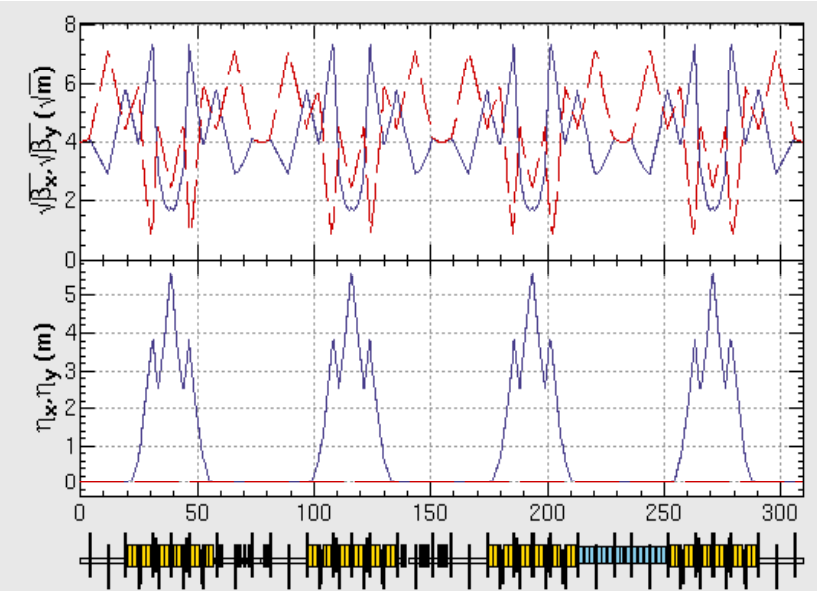
Lattice design and tolerances for 10 GeV FEL



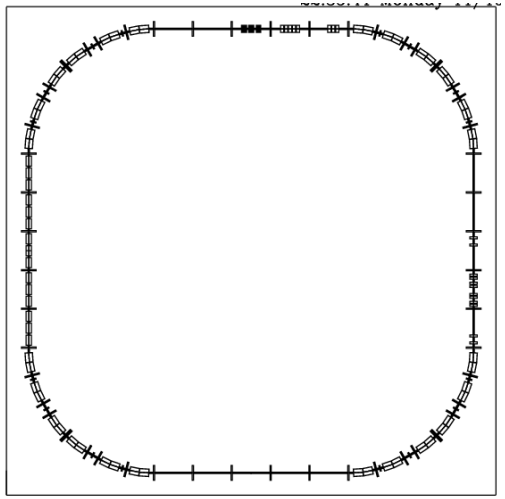


0.1 deg. rms rf phase
0.05 % rms rf voltage
0.7 ps rms gun jitter

2 GeV PS for PEFP



100 MeV linac under constructing



2 GeV PS for next stage

Summary

❑ R&D for ILC EDR

- ✓ RTML - Alternative BC (E-S Kim)
- ✓ DR - Lattice / Instabilities (E-S Kim, H. Jin)
- ✓ ATF2 - BPMs (A. Heo, W. Jeong)
- ✓ SRF - Cavity analysis (I. Hwang)
- ✓ HLRF - IOT (H-S Kim)
- ✓ L-band BPM for ML (S. Shin)

❑ Design R&D for light sources and PS

❑ Ecloud studies in Upgrade KEKB if planned (proposing by Korean Belle-group)