ATF/ATF2 Status

T. Tauchi,

ILC PAC Meeting, IFIC, Valencia,13-14 May 2010

References :

ATF2 Proposal, KEK Report 2005-2

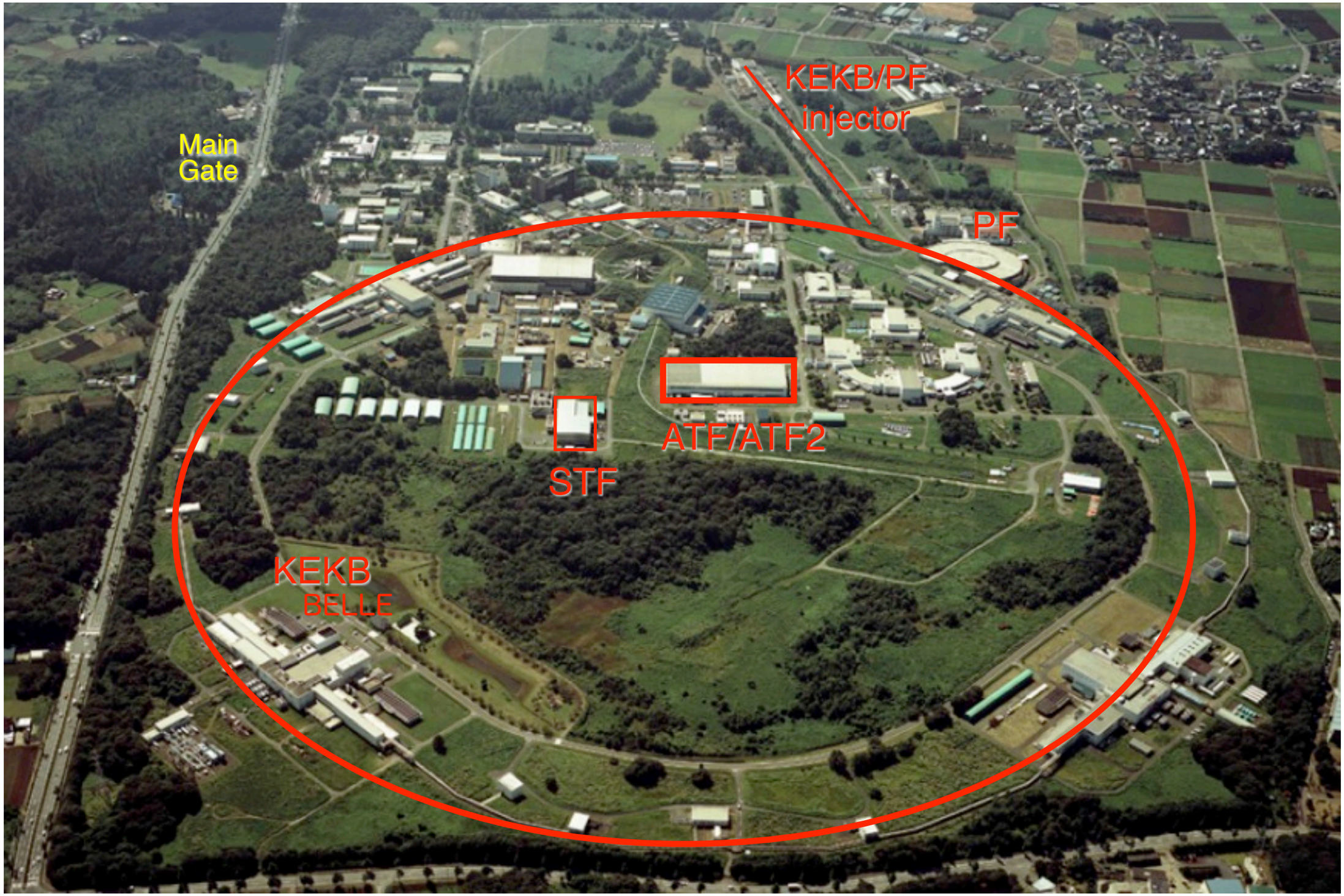
ATF2 Proposal Vol.2, KEK Report 2005-9

ATF home page : http://atf.kek.jp/

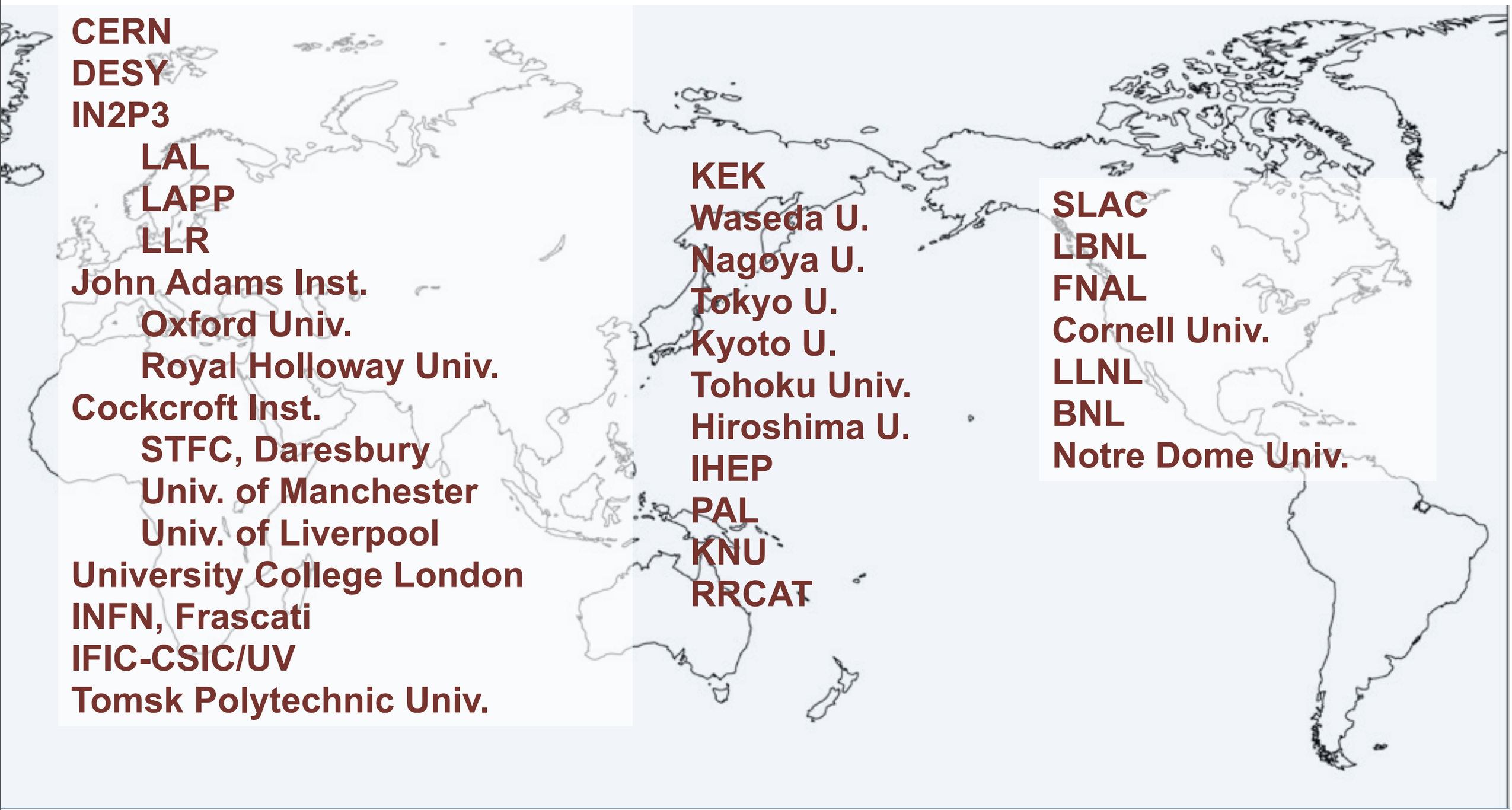
with 110 authors (25 research institutes around the world)

KEK High Energy Accelerator Research Organization

in Tsukuba site, Japan



ATF International Collaboration



CERN
DESY
IN2P3
- LAL
- LAPP
- LLR

John Adams Inst.
- Oxford Univ.
- Royal Holloway Univ.

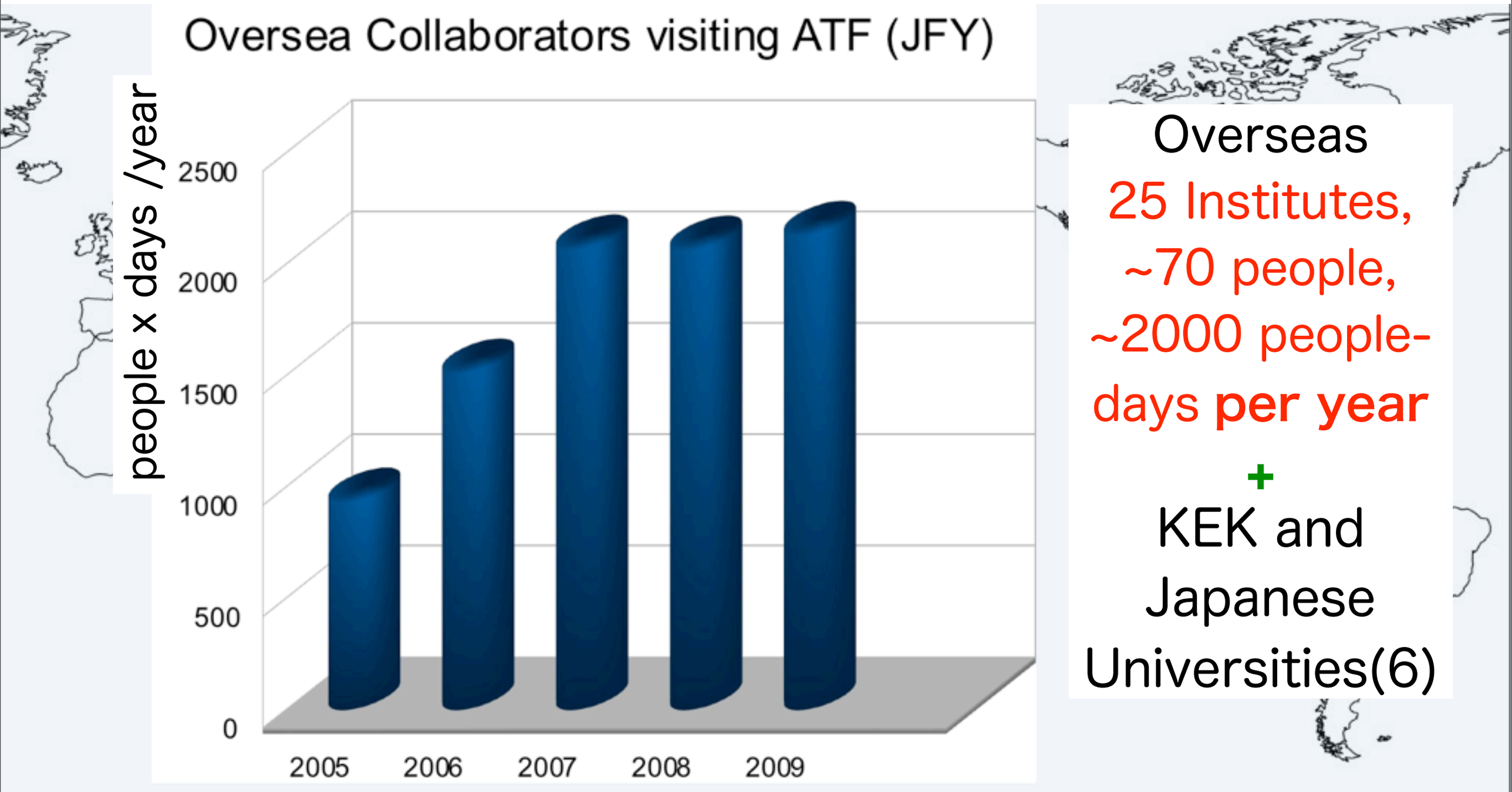
Cockcroft Inst.
- STFC, Daresbury
- Univ. of Manchester
- Univ. of Liverpool

University College London
INFN, Frascati
IFIC-CSIC/UV
Tomsk Polytechnic Univ.

KEK
Waseda U.
Nagoya U.
Tokyo U.
Kyoto U.
Tohoku Univ.
Hiroshima U.
IHEP
PAL
KNU
RRCAT

SLAC
LBNL
FNAL
Cornell Univ.
LLNL
BNL
Notre Dome Univ.

ATF International Collaboration



Overseas

25 Institutes,

~70 people,

~2000 people-days **per year**

+

KEK and Japanese Universities(6)

Necessary Deliverables from TF for BDS and DR

Test Facility	Deliverable	Date
Hardware development, Optics and stabilisation demonstrations:		***JFY***
ATF	**Demo. of reliable operation of fast kickers meeting the specifications for the ILC damping ring.**	**2010**
	Generation of 1 pm-rad low emittance beam 0.1x ε_{ILC}, 3 x Luminosity	**2009**
ATF2	**Demo. of compact Final Focus optics (design demagnification, resulting in a nominal 35 nm beam size at focal point).**	**2010**
	Demo. of prototype SC and PM final doublet magnets	**2012**
	Stabilisation of 35 nm beam over various time scales.	**2012**
Electron cloud mitigation studies:		
CESR-TA	**Re-config. (re-build) of CESR as low-emittance e-cloud test facility. First meas. of e-cloud build-up using instrumented sections in dipoles and drifts sections (large emittance).**	**2008**
	Achieve lower emittance beams. Meas. of e-cloud build up in wiggler chambers.	**2009**
	Characterisation of e-cloud build-up and instability thresholds as a func. of low vertical emittance (≤20 pm)	**2010**
DAΦNE	**Fast kicker design and pulser reliability check**	**2010**
	Characterisation of e-cloud build-up and instability thresholds	**2010**
SLAC/LLNL	**Fast kicker pulser development**	**2010**

ATF Accelerator Test Facility, KEK

1997-2008

ε_y=11pm ,2002

ε_y= 4pm ,2004

Extraction line :utilization of low emittance beam

beam instrumentation, collimator damage

Cavity BPM
nanometer res.

FONT
fast feedback (ns)

Pulsed Laser Wire Scanner
for beam size monitor (μm)

ODR, OTR
single shot meas.

Collimation damage
phase-1

Beam Dynamics

CSR

LW, Cavity Compton

Damping Ring
ultra low emittance beam (2pm)
dynamics -fast ion instability
beam instrumentation (BPM,LW)

Fast kicker
rise time < 3ns

XSR

Energy: 1.28 GeV
Electron bunch:
$2x10^{10}$ e/bunch
1 ~ 20 bunches/train
3 trains/ring
1.56 Hz

RF Gun
multi-bunch beam

S-band Linac (70m)
multi-bunch acceleration

Publication of First Results by May 2009

in PR-STAB 13, 042801 (2010)

Present status and first results of the final focus beam line at the KEK Accelerator Test Facility

P. Bambade,[1,6,*] M. Alabau Pons,[2] J. Amann,[3] D. Angal-Kalinin,[4] R. Apsimon,[5] S. Araki,[6] A. Aryshev,[6] S. Bai,[7] P. Bellomo,[3] D. Bett,[5] G. Blair,[9] B. Bolzon,[8] S. Boogert,[9] G. Boorman,[9] P. N. Burrows,[5] G. Christian,[5] P. Coe,[5] B. Constance,[5] J.-P. Delahaye,[10] L. Deacon,[9] E. Elsen,[11] A. Faus-Golfe,[2] M. Fukuda,[6] J. Gao,[7] N. Geffroy,[8] E. Gianfelice-Wendt,[12] H. Guler,[13] H. Hayano,[6] A.-Y. Heo,[14] Y. Honda,[6] J. Y. Huang,[15] W. H. Hwang,[15] Y. Iwashita,[16] A. Jeremie,[8] J. Jones,[4] Y. Kamiya,[17] P. Karataev,[9] E.-S. Kim,[14] H.-S. Kim,[14] S. H. Kim,[15] S. Komamiya,[17] K. Kubo,[6] T. Kume,[6] S. Kuroda,[6] B. Lam,[3] A. Lyapin,[18] M. Masuzawa,[6] D. McCormick,[3] S. Molloy,[9] T. Naito,[6] T. Nakamura,[17] J. Nelson,[3] D. Okamoto,[19] T. Okugi,[6] M. Oroku,[17] Y. J. Park,[15] B. Parker,[20] E. Paterson,[3] C. Perry,[5] M. Pivi,[3] T. Raubenheimer,[3] Y. Renier,[1,6] J. Resta-Lopez,[5] C. Rimbault,[1] M. Ross,[12] T. Sanuki,[19] A. Scarfe,[21] D. Schulte,[10] A. Seryi,[3] C. Spencer,[3] T. Suehara,[17] R. Sugahara,[6] C. Swinson,[5] T. Takahashi,[22] T. Tauchi,[6] N. Terunuma,[6] R. Tomas,[10] J. Urakawa,[6] D. Urner,[5] M. Verderi,[13] M.-H. Wang,[3] M. Warden,[5] M. Wendt,[12] G. White,[3] W. Wittmer,[3] A. Wolski,[23] M. Woodley,[3] Y. Yamaguchi,[17] T. Yamanaka,[17] Y. Yan,[3] H. Yoda,[17] K. Yokoya,[6] F. Zhou,[3] and F. Zimmermann[10]

(ATF Collaboration)

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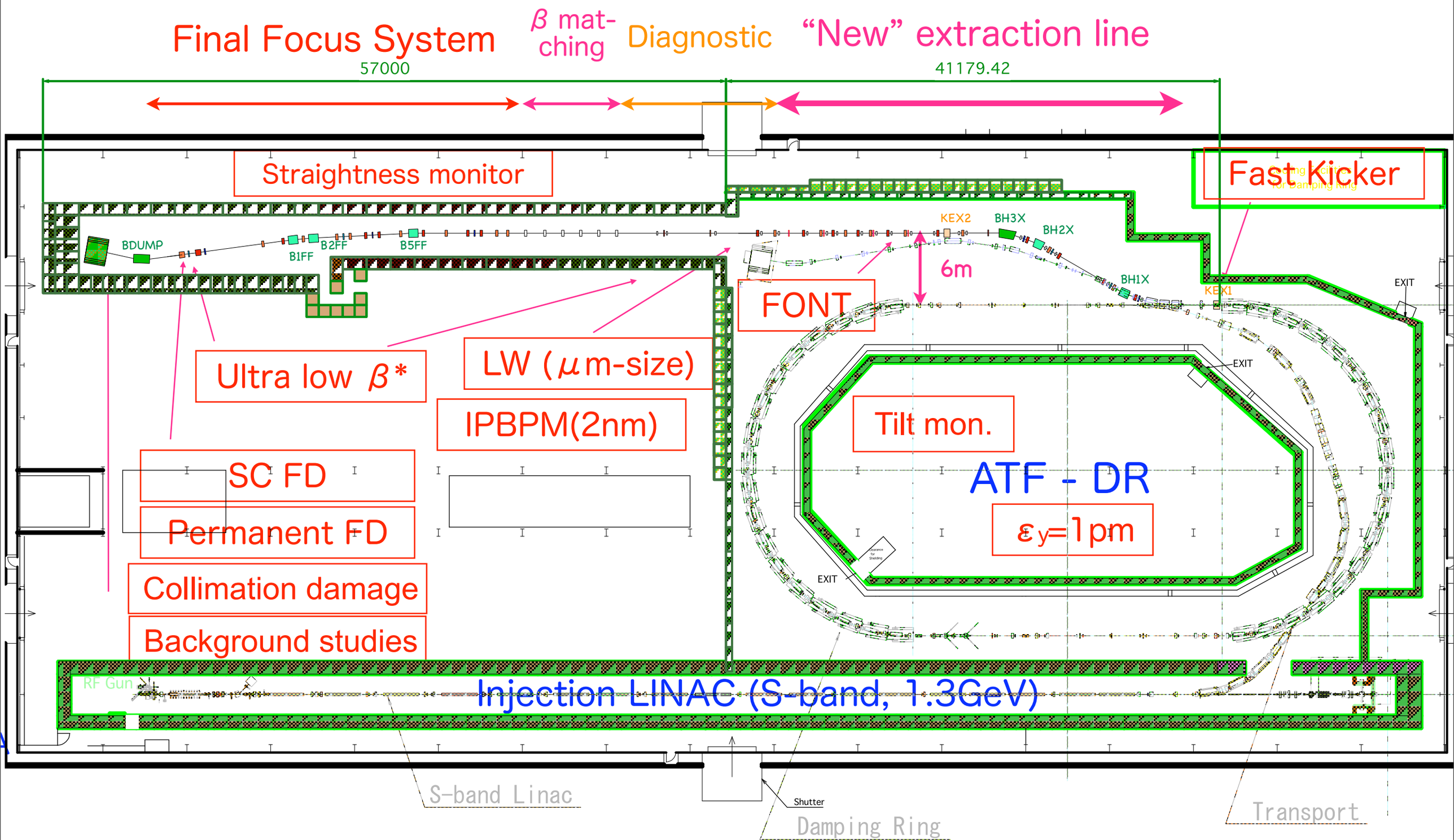
(Received 1 November 2009; published 21 April 2010)

ATF2 is a final-focus test beam line which aims to focus the low emittance beam from the ATF damping ring to a vertical size of about 37 nm and to demonstrate nanometer level beam stability. Several advanced beam diagnostics and feedback tools are used. In December 2008, construction and installation were completed and beam commissioning started, supported by an international team of Asian, European, and U.S. scientists. The present status and first results are described.

ATF2 beam line and planned/proposed R&Ds

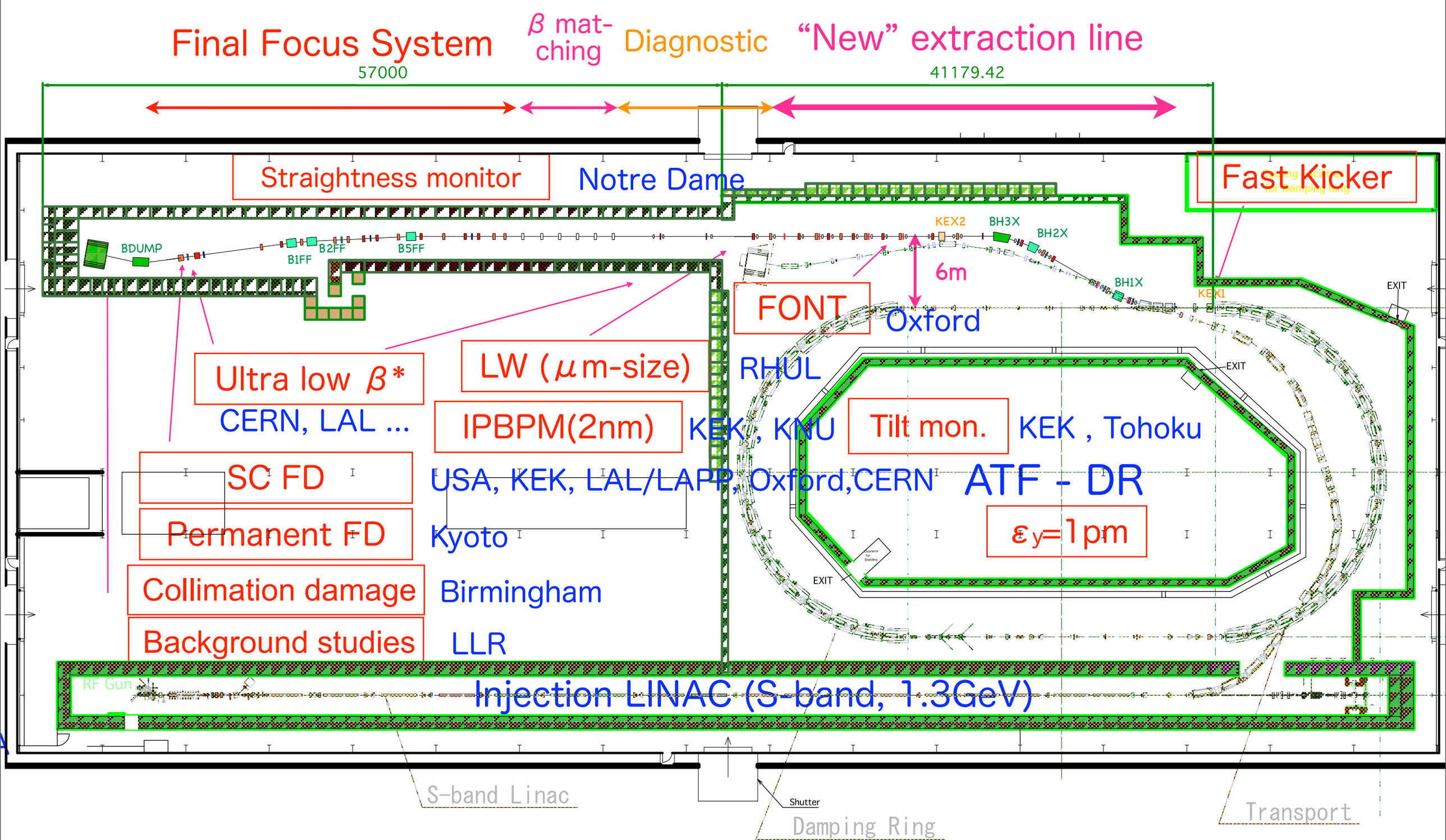
2008 - 2010 - 2012 (- 2014 - ?)



2010年 5月 13日 木曜日

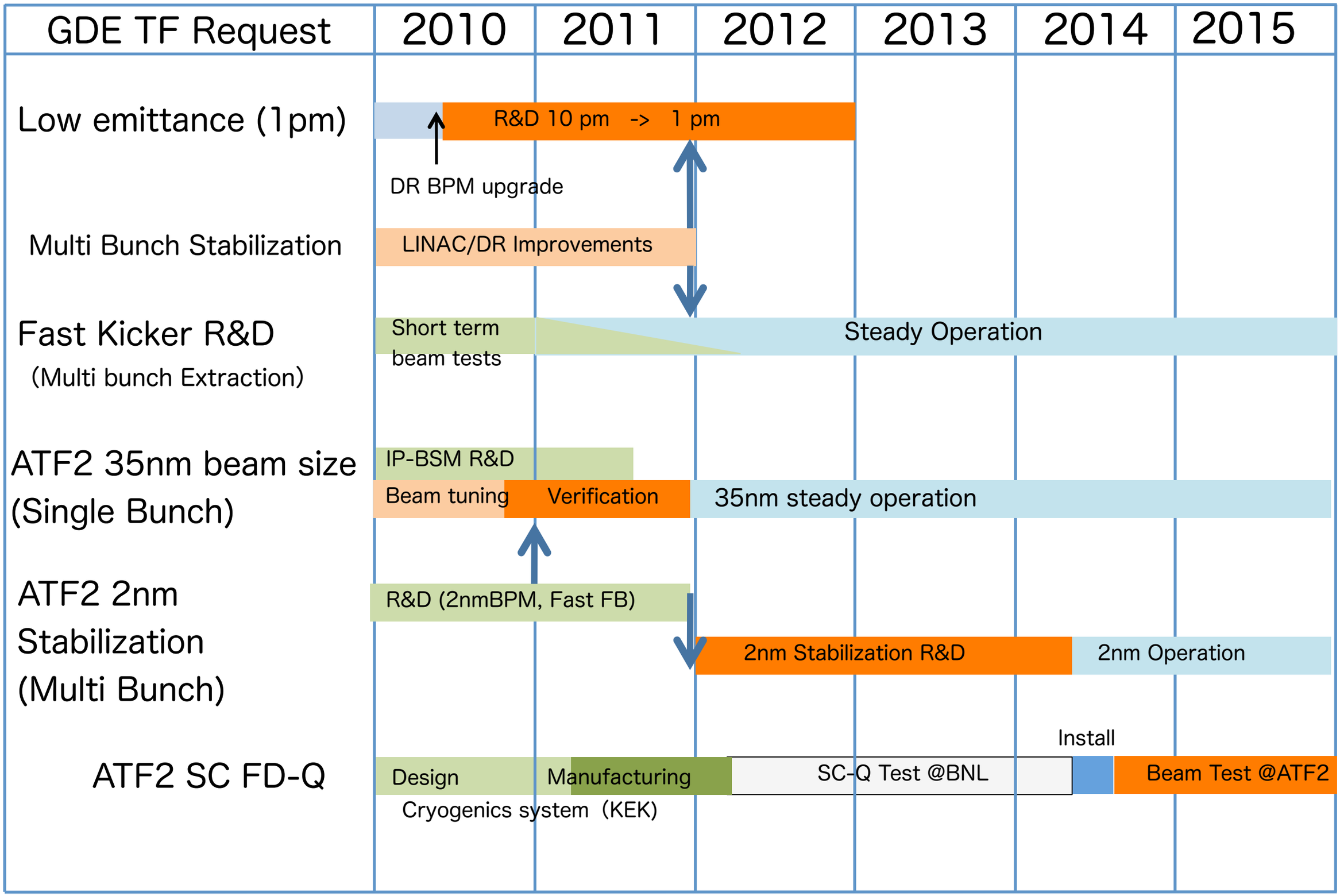
ATF2 beam line and planned/proposed R&Ds

2008 - 2010 - 2012 (- 2014 - ?)

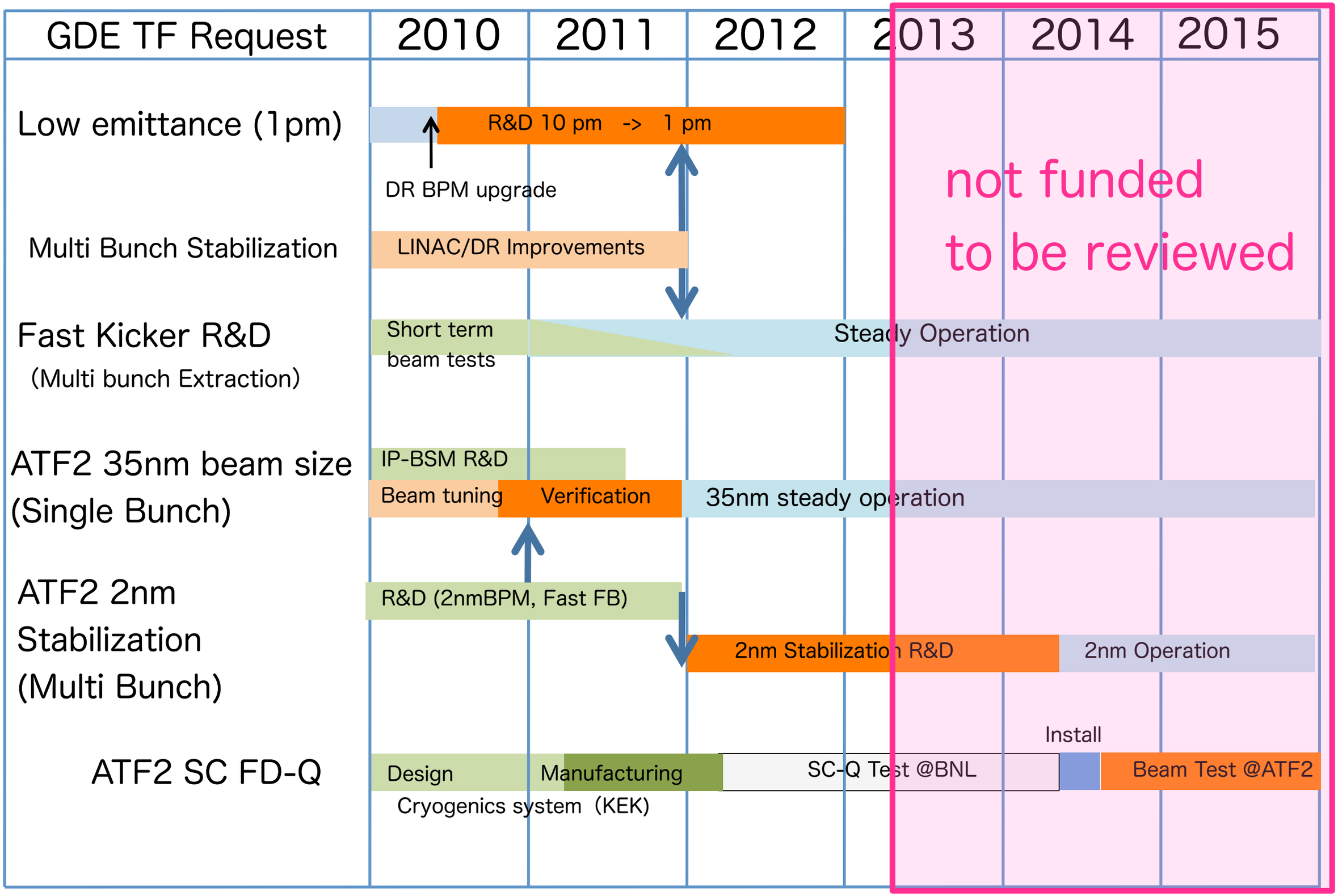


2010年 5月 13日 木曜日

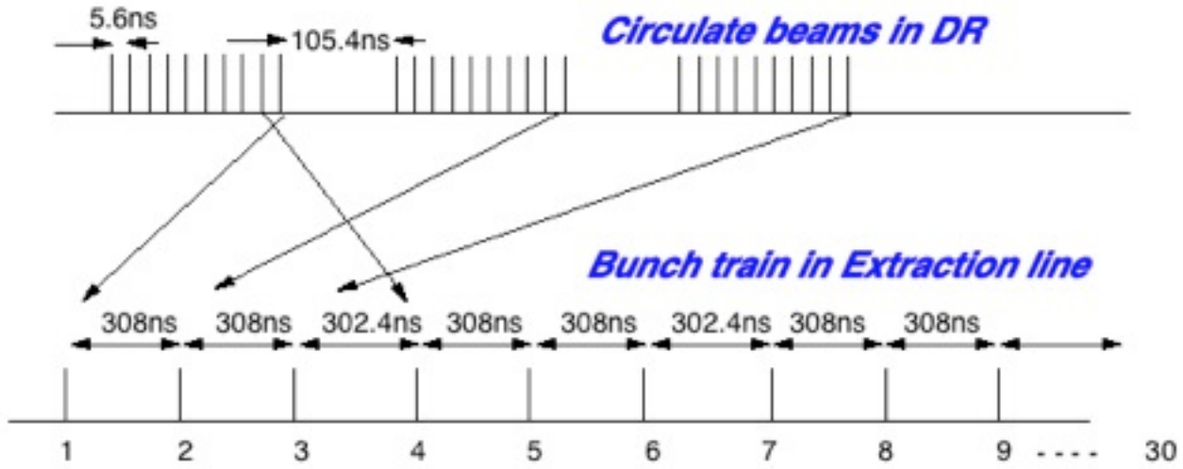
ATF long term plan

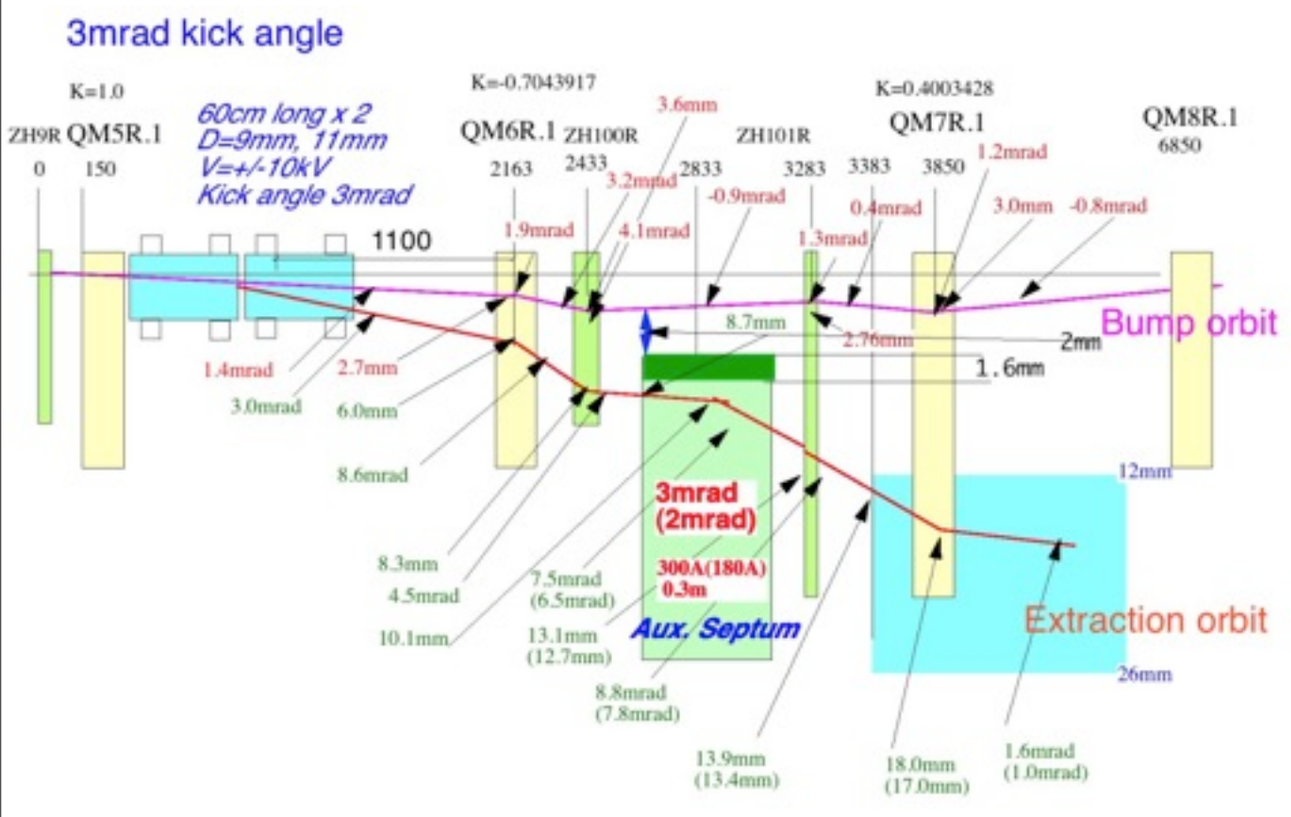


ATF long term plan

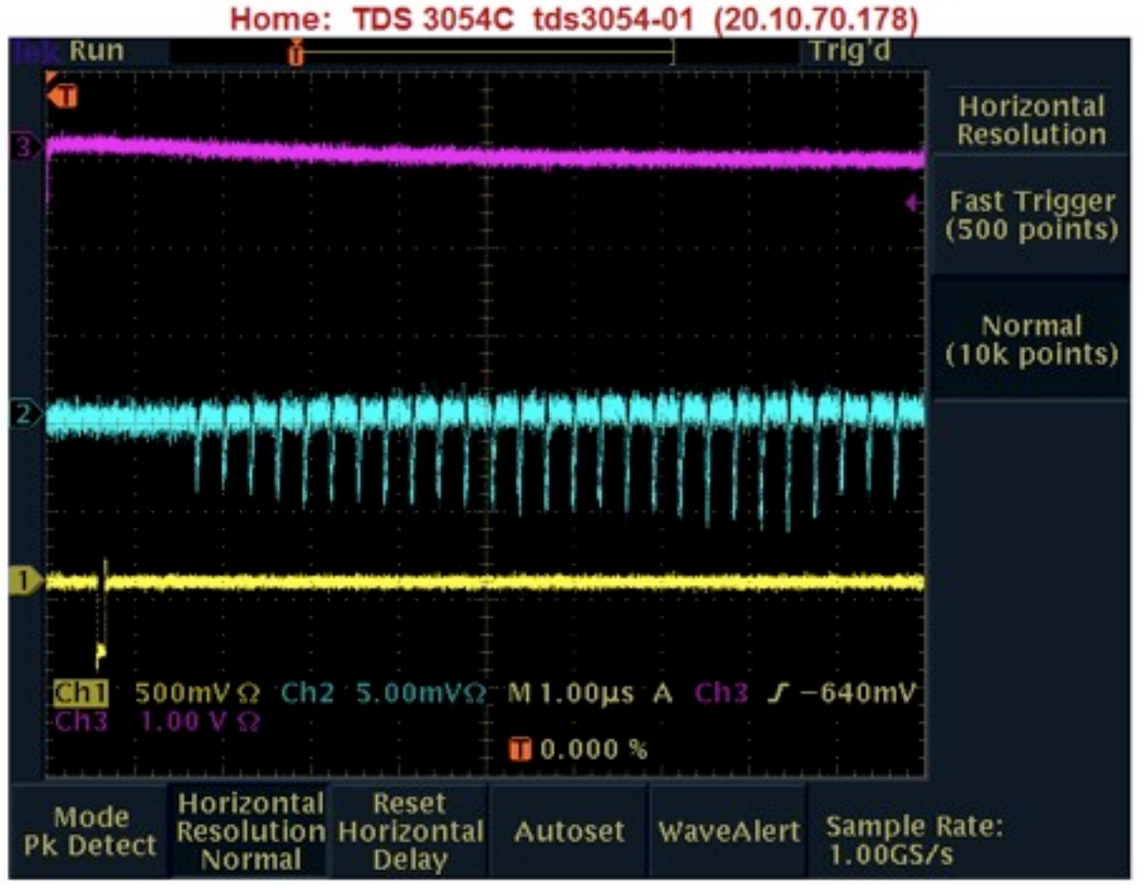


Fast Kicker in March, 2010



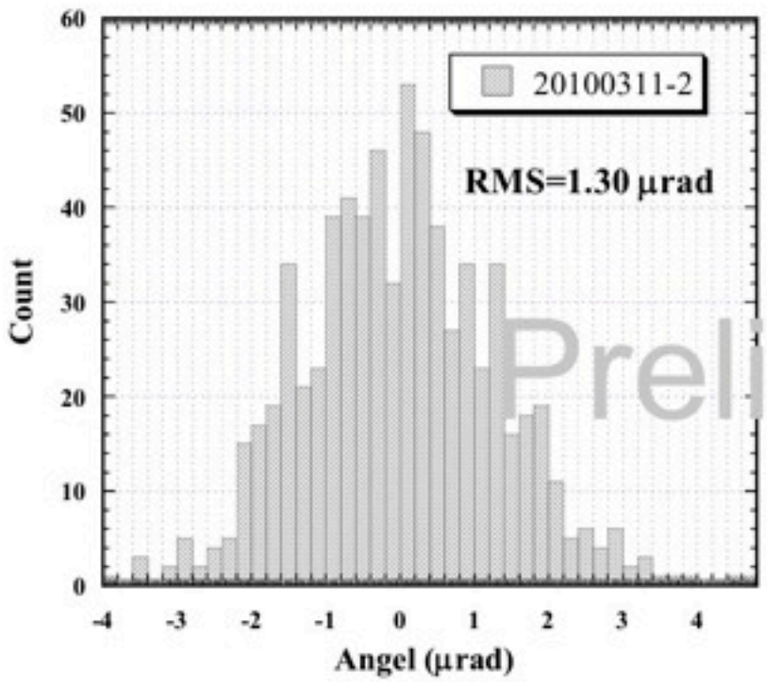


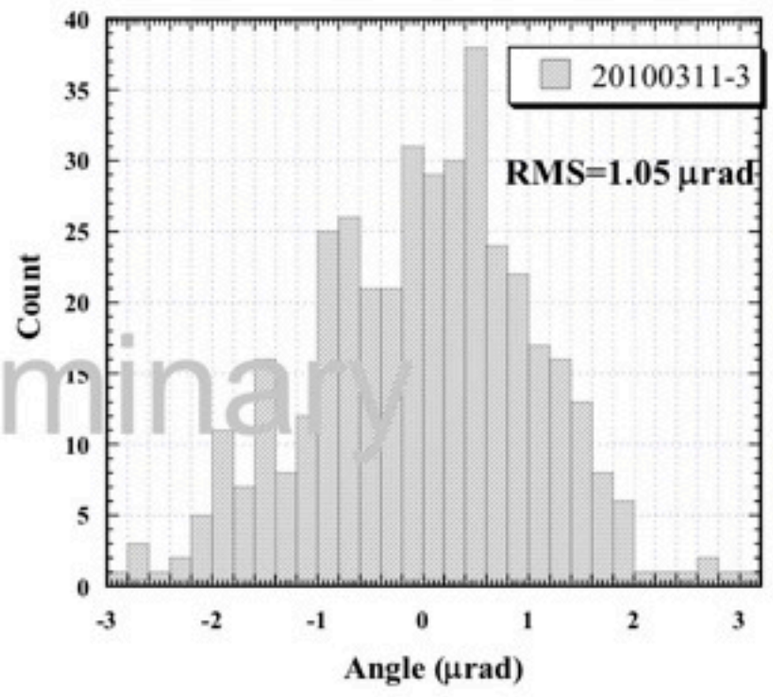
Extraction Orbit

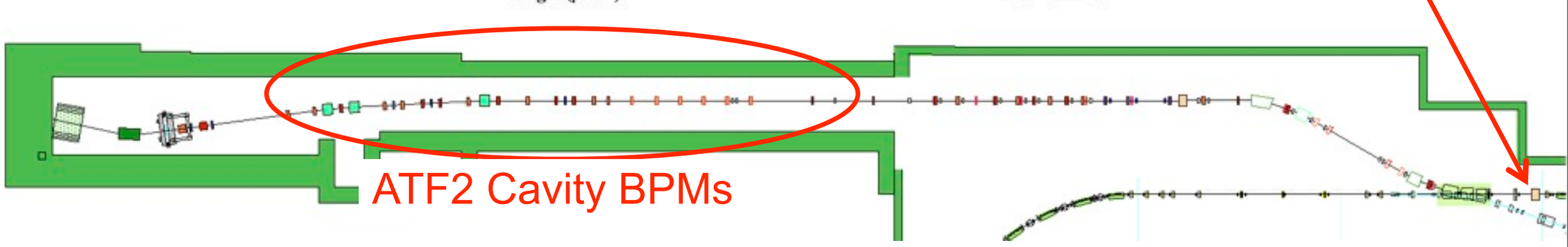


Bunch current at the extraction line

Kick angle jitter measurement

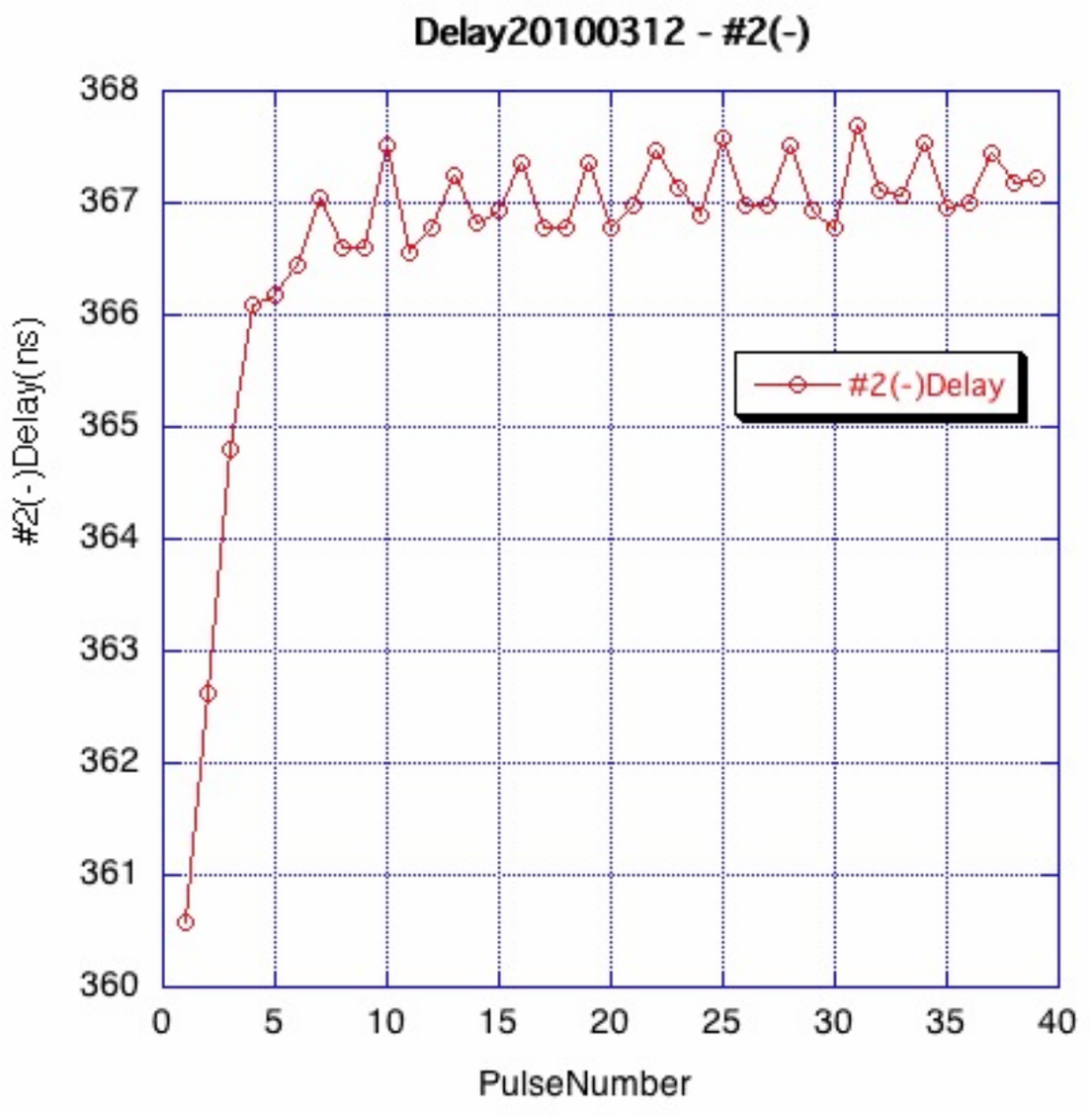






The kick angle jitter was estimated from the BPM measurement of the ATF2 beamline. The fit from the measured positions and the R12 of each location shows the angle distribution of the kicker. Figure shows the result of two set of the data. Each data used 700 shots and 400 shot, respectively. The measured angle jitters were 1.3micro-rad and 1.05micro-rad, respectively(preliminary). **The angle jitters of the kicker were 4.3×10^{-4} and 3.5×10^{-4}, respectively.** <- good enough for beam size measurement for single bunch

Issues to be improved

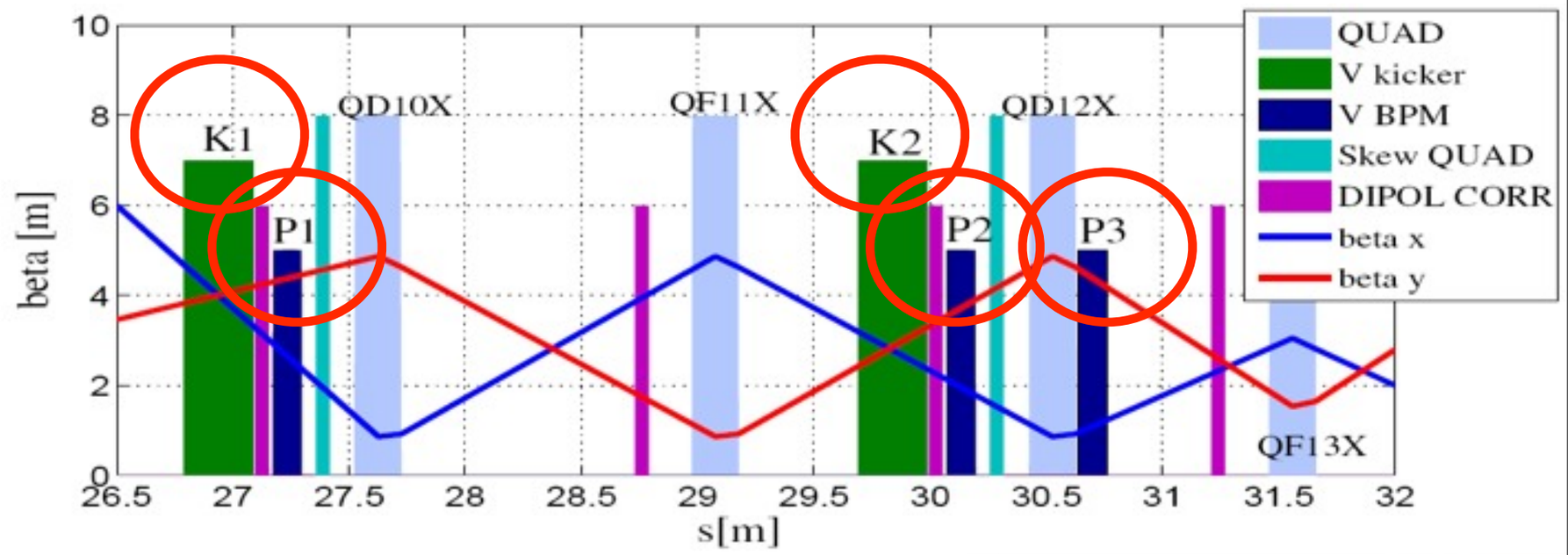


Time delay from input to output as a function of pulse number (FID pulser).

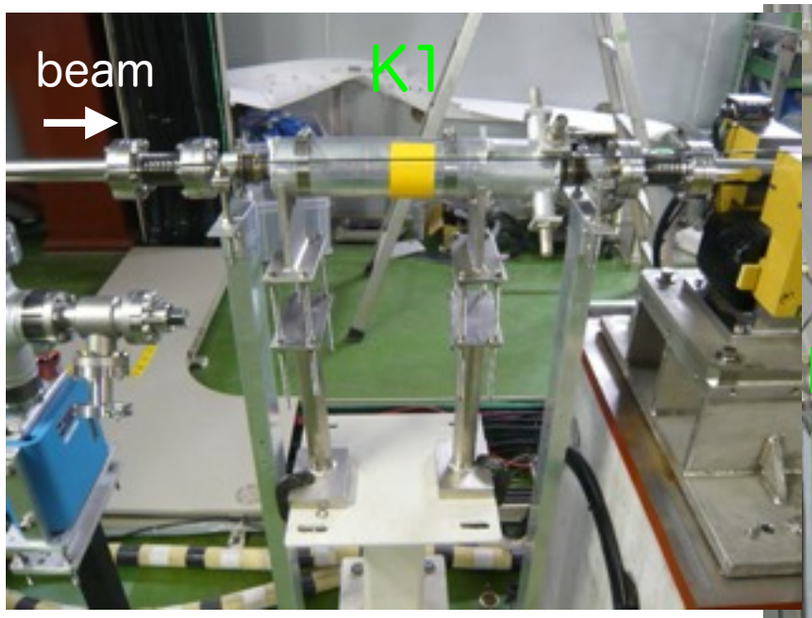
1. FID pulser performance for each pulser has different time delay now, so timing adjustment is difficult .
2. BPM performance with multi-bunch beam
3. Stable 5.6ns spacing multi-bunch beam generation - laser system
4. Stable multi-bunch storage in DR

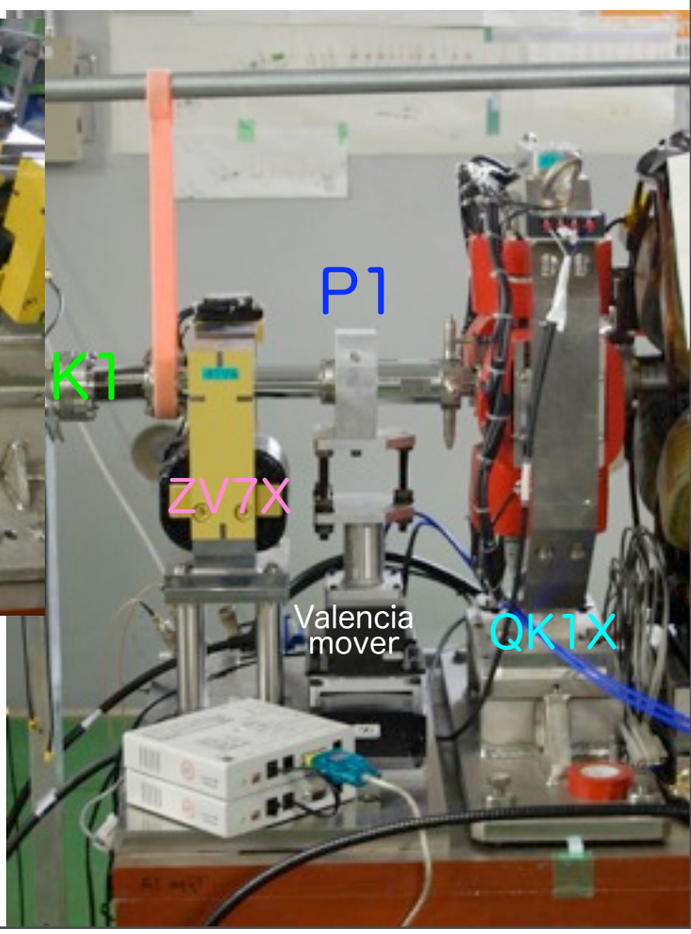
ATF2 FB system: FONT5 (Oxford,KEK)

Dedicated system:



- **2 stripline kickers (K1 , K2) + fast drive amplifiers**





- **3 stripline BPMs(P1,P2,P3) + fast analogue front-end electronics 9-channel digital FB processor**

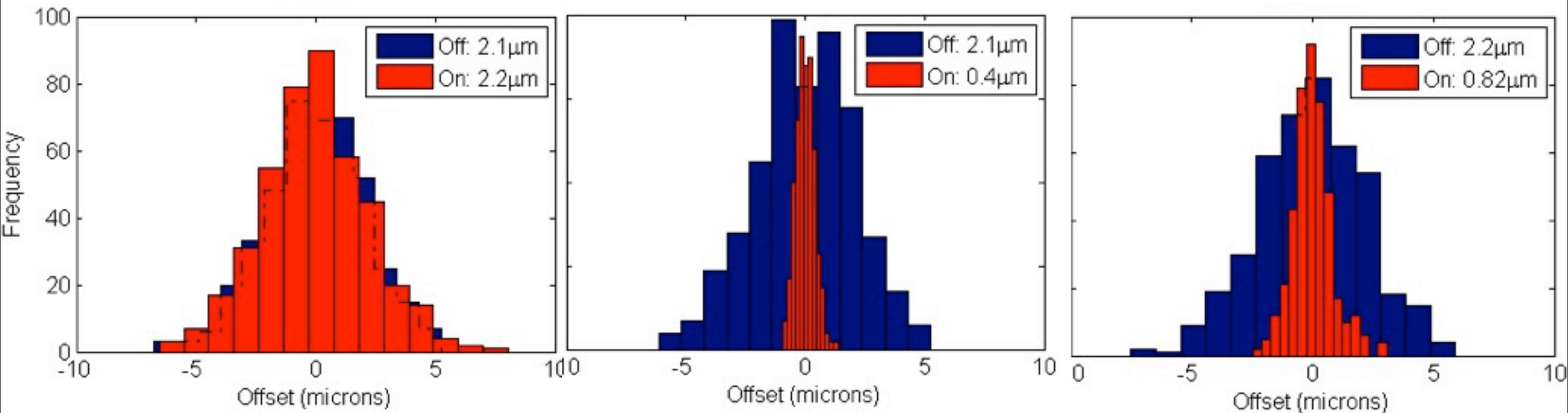
P2 → K1 loop jitter reduction

(April 16 2010)

Bunch 1

Bunch 2

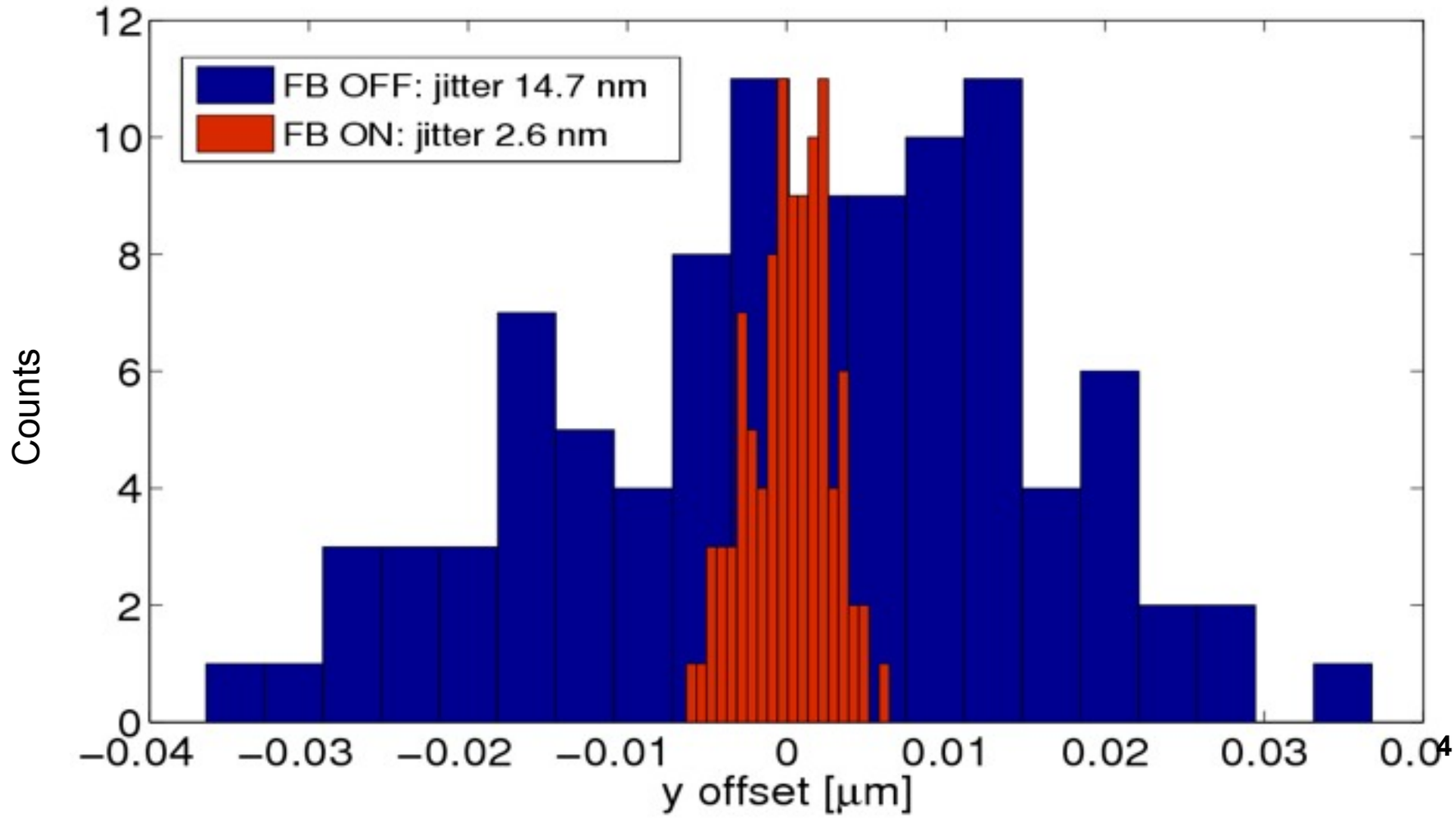
Bunch 3



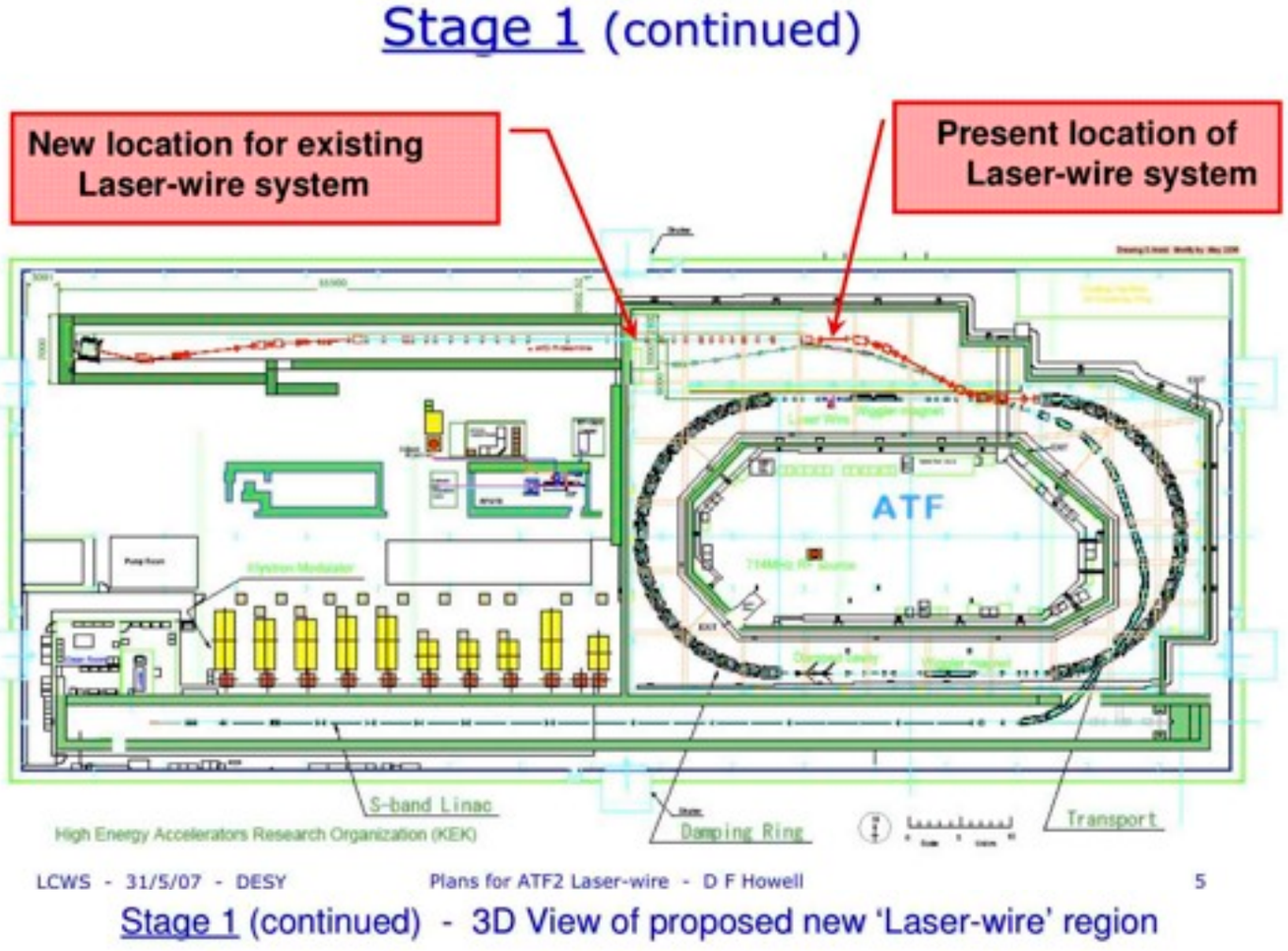
2.1 um → 0.4 um → 0.8 um

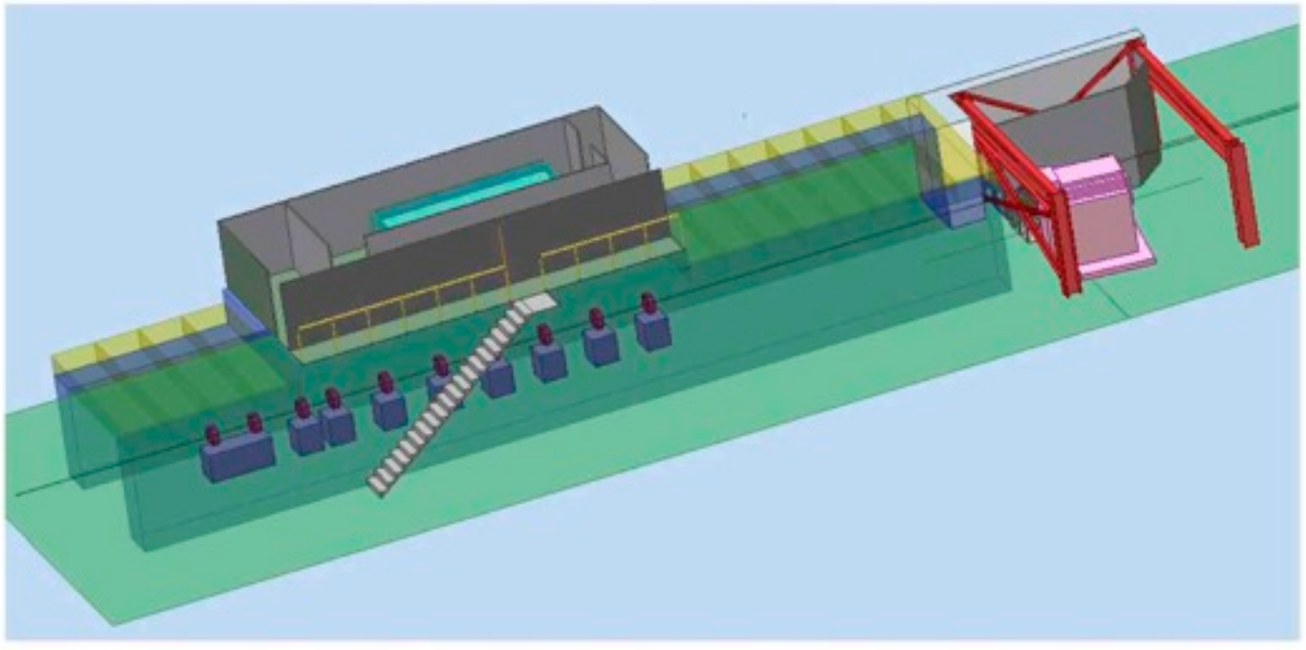
Jitter comparison at IP

Assuming perfect lattice, no further imperfections (!)



Laser Wire (JAI,KEK)





2009

- **relocation of the laser room and the collision chamber**

2010

- **commissioning of the laser system**
- **commissioning of the laser transport and collision system (2010/Mar/22~)**
- **beam study was resumed in April.**

Challenges toward the 1pm emittance

Simulation:

- **BPM offset error should be < 0.1 mm. ("BBA")** **--> εy ~ 2 pm**
- **Magnet re-alignment, < 30 μm** **--> εy ~ 1 pm**

DR BPM upgrade (FNAL, SLAC, KEK)

a high resolution BPM system

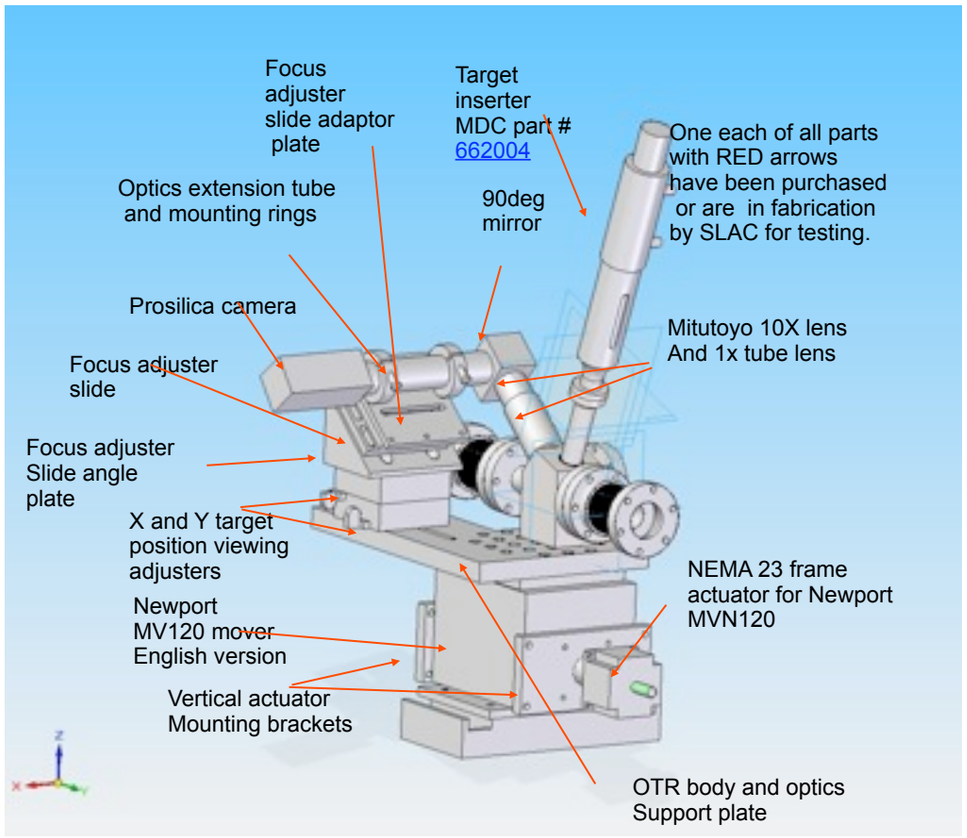
- **a broadband turn-by-turn mode (< 10 μm resolution)**
- **a narrowband mode with high resolution (~ 100 nm range)**

- **Electronics for all DR BPM (96) is under preparation at FNAL.**
- **Installation will be done around the IPAC10 (May).**

Multi-Optical Transition Radiation System for ATF2

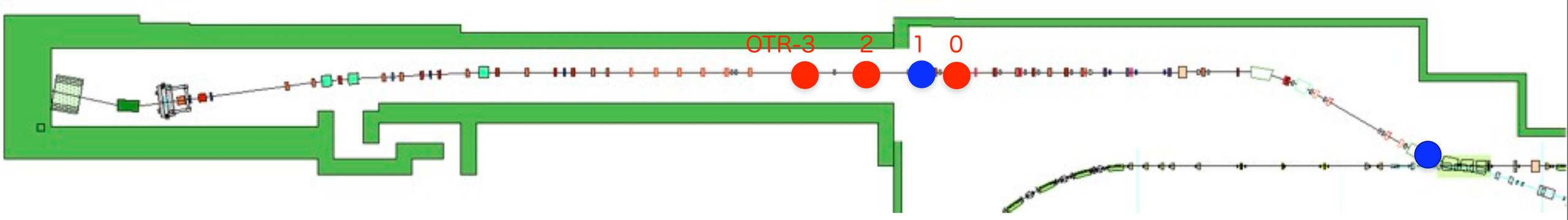
for Fast Emittance Measurement

A.Faus-Golfe, J.Alabau-Gonzalvo, C.Blanch, J.V.Civera, J.J.García Garrigós
IFIC (CSIC-UV)
D.McCormick, G.White, J. Cruz
SLAC
and
KEK team



1. Most parts have been arrived at ATF.
2. Two persons from IFIC visited ATF in March, 2010 and assembled the OTRs on the test stands.
3. Control cables were put between the beamline and a control hut.

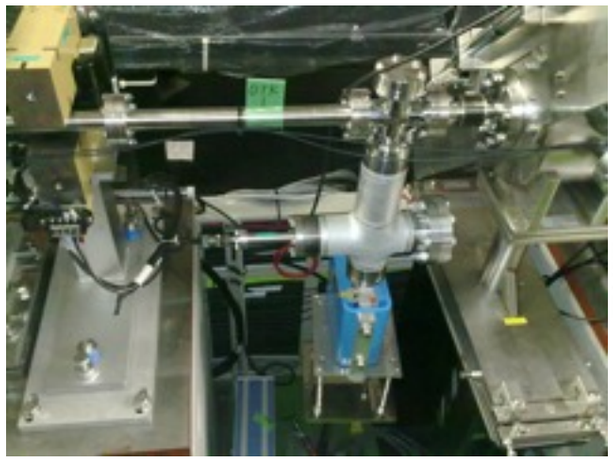
- One of 4 OTRs was installed in May, and 3 OTRs will be installed after IPAC10.

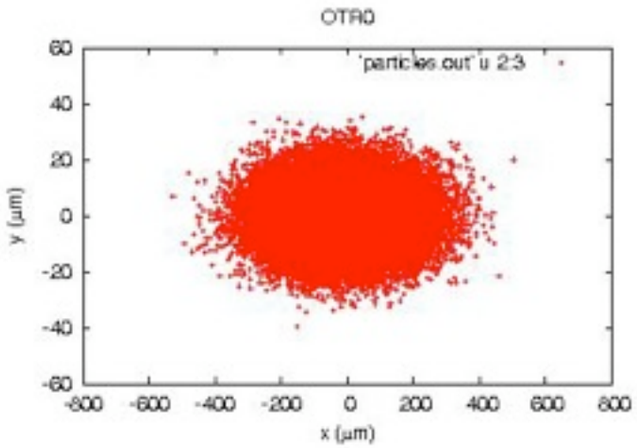


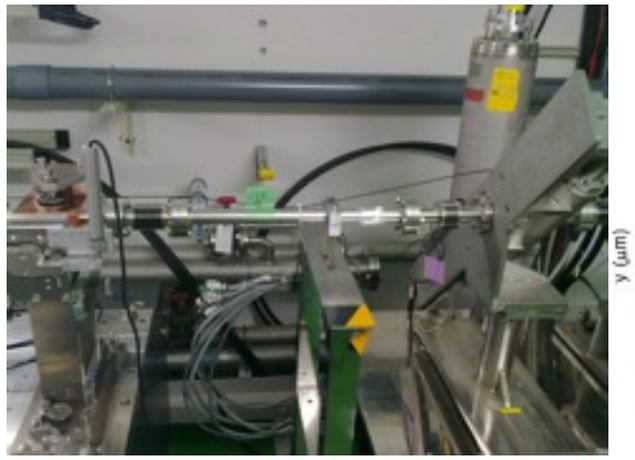
H/W

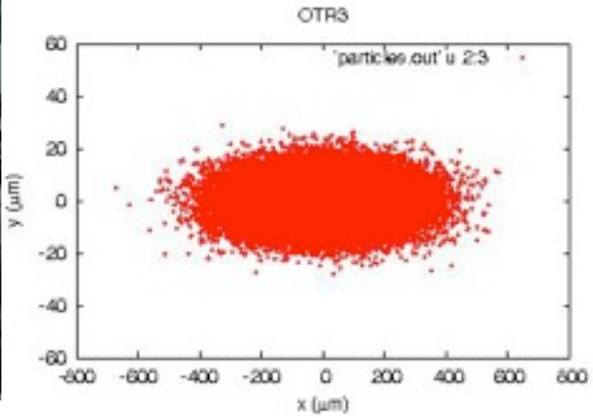
Summary of multi-OTR Status

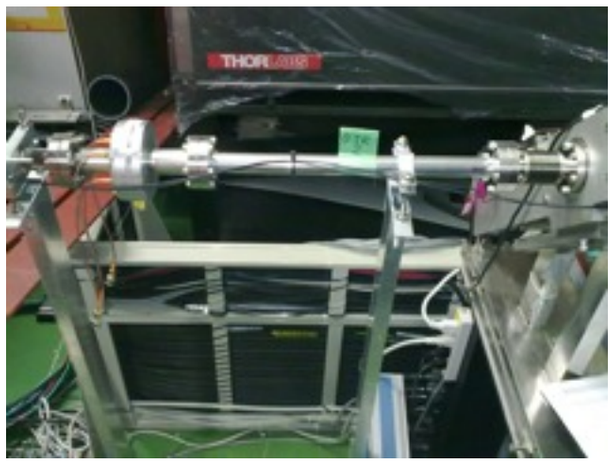
Locations

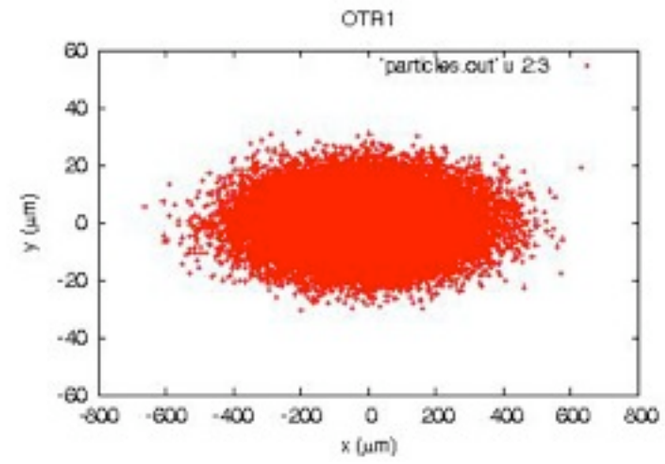


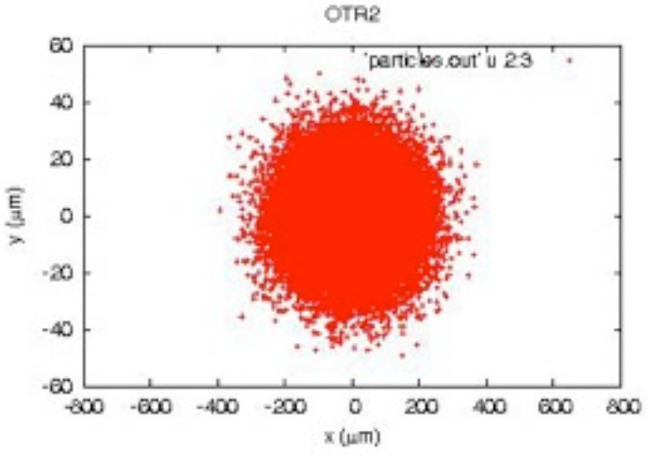












Tracking comparison with
Wire Scanners

OTR0 σx: 118 um σy: 9 um	WS0 σx: 82 um σy: 11 um
OTR1 σx: 148 um σy: 8 um	WS1 σx: 157 um σy: 7 um
OTR2 σx: 92 um σy: 12 um	WS2 σx: 88 um σy: 13 um
OTR3 σx: 144 um σy: 7 um	WS3 σx: 151 um σy: 6 um

OTR resolution = 2 μm

Operation with Large Beta Optics ($\beta^*_{x/y}$=8cm/1cm(8cm until Mar.)) ,

IPBSM in LW mode in Feb.-May and the interference mode in Nov.-Dec.

2009 Annual Calendar

January 2009
ATF Operation
new QM7R,HA-PS broken

February 2009
ATF Operation
BPM(1)/week
1st IPBSM LW sig. on 2/27

first LW signal

March 2009
ATF Operation:
BPM(1),FONT(1)/week
DR-BBA

April 2009
ATF Operation
BPM(1),FONT(1)/week
No signal in IPBSM

first try to observe interference signal

no IPBSM signal

May 2009
ATF Operation
BPM(1),FONT(1),LW(1)/week
Signal back in IPBSM, 5/29

IPBSM signal back

June 2009
ATF Operation
fast kicker study at EXT

October 2009
ATF Operation
multibeam was exracted!

multibunch beam extracted by fast kicker

PAC review

November 2009
ATF Operation
BPM(2),POS(1),FONT(2)
1st IPBSM sig. on 11/13

first interference signal (3^o crossing)

December 2009
ATF Operation
BPM(2),POS(2),FONT(3)
seed laser was broken
beam size < 1um by C-wire

σ^*_y<1.5μm by C -wire (5μmΦ)

ATF Operation
start up
ATF2 beam tuning
IPBSM with 2-3 degree
IPBSM in laser wire mode
Fast Kicker
No beam at EXT

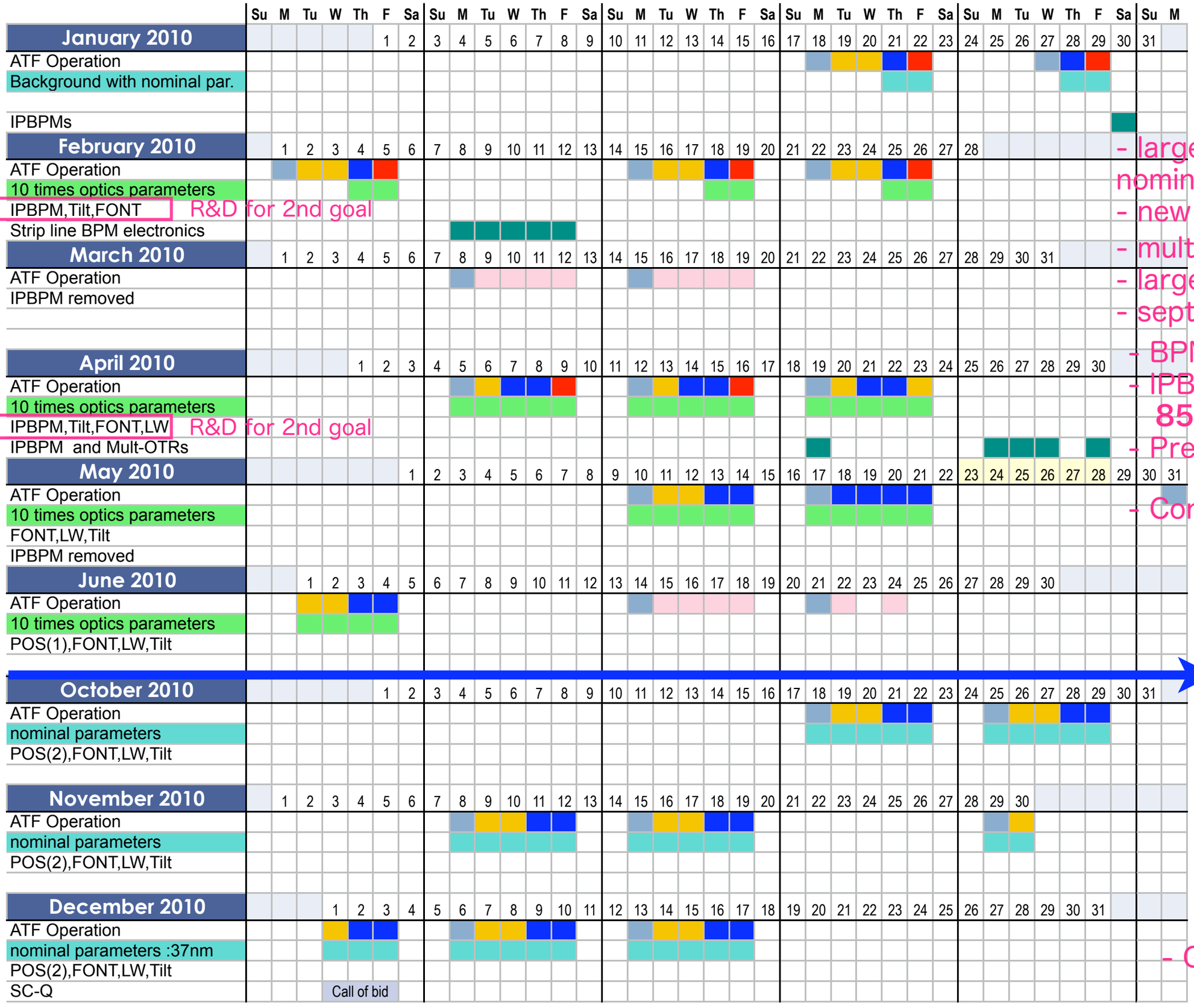
- calibration of the BPM system
- commissioning the 5 wire scanner system
- measurement/ correction of dispersion and coupling
- measurement of emittance at DR and ATF2
- modeling beam line

In summer shutdown;
- alignment
- installation of new screens, wires, knife edge in the IP chamber

- IP beam size tuning by the C-wire scanner

Operation with 10 times Beta Optics ($\beta^*_{x/y}$=4cm/1mm)

2010 Annual Calendar



R&D for 2nd goal

R&D for 2nd goal

DR Study + QBPM Calib + FON
start up
ATF2 beam tuning
IPBSM with 2 to 174 degree
Fast Kicker

Installation

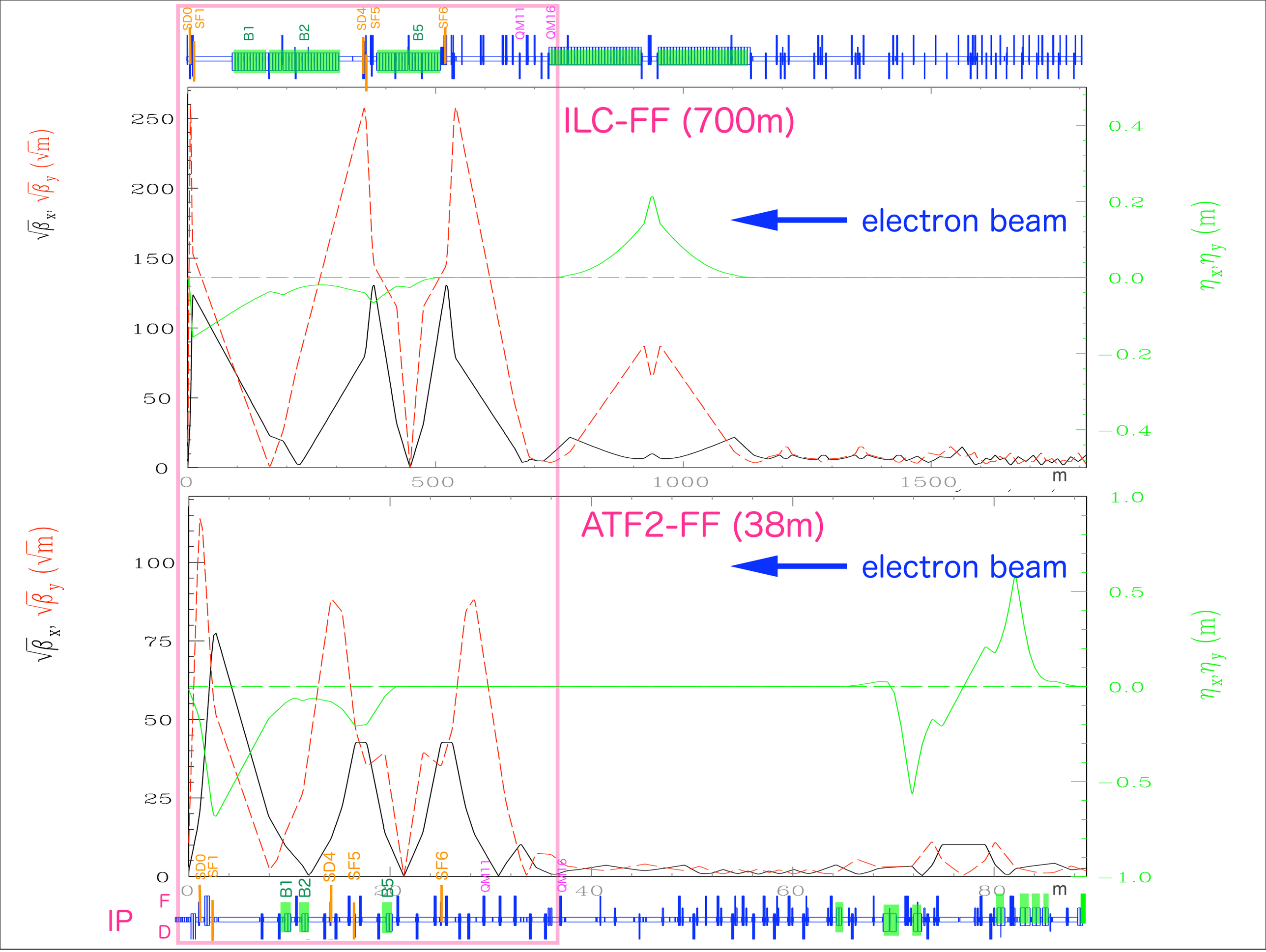
- large background at the nominal optics
- new stripline BPM electronics
- multipole field at 2nd kicker
- large wake field by IPBPM
- septum #3 re-aligned(tilt)
- BPM calibration established
- IPBSM fully commissioned
  855nm beam size
- Pre-continuous run (3 shifts)

IPAC10

- Continuous run for a week
  - goal = 100nm

In summer shutdown;
- multiple OTRs ?

- Goal = 37nm



2010年 5月 13日 木曜日

57 m

41.2 m

Final Focus System

Beam Diagnostics

Coupling Correction

Dispersion Cor.

Extraction

QK4X QK3X QK2X QK1X QS2X QF6X

KEX2

ATF Dumping Ring (DR)

QS1X QF1X

MS1X

Septa

KEX1

Final Focus System (38m)

Beam Diagnostics (12m)

MONALISA

CLIC table

LW signal

BSM (IPBPM)

ML2FF ICT

MPIP

QD0 QF1

IP

SD0 SF1

BSM signal

MW1IP

MSPIP

MS2FF

MREF1 QF3

QD2B B1 B2

QD2A

SD4 QD4A

QF5A QD4B MREF2

QF5B SF5

QD6 B5

QF7 QD8

QF9A SF6

QF9B QD10A

MREF3 QD10B

QM11 MFB1

12 13 14 15 16

MFB2 (10mm)

ZV1 ZH1

nBPMs Tilt

MW4X

feedback

QF21X ZH10X

MW3X ICT

LW2X(3D)

feedback

QD20X MW2X

ZV11X

LW1X(1um)

QF19X ZH9X

MW1X

ZV10X QK4X

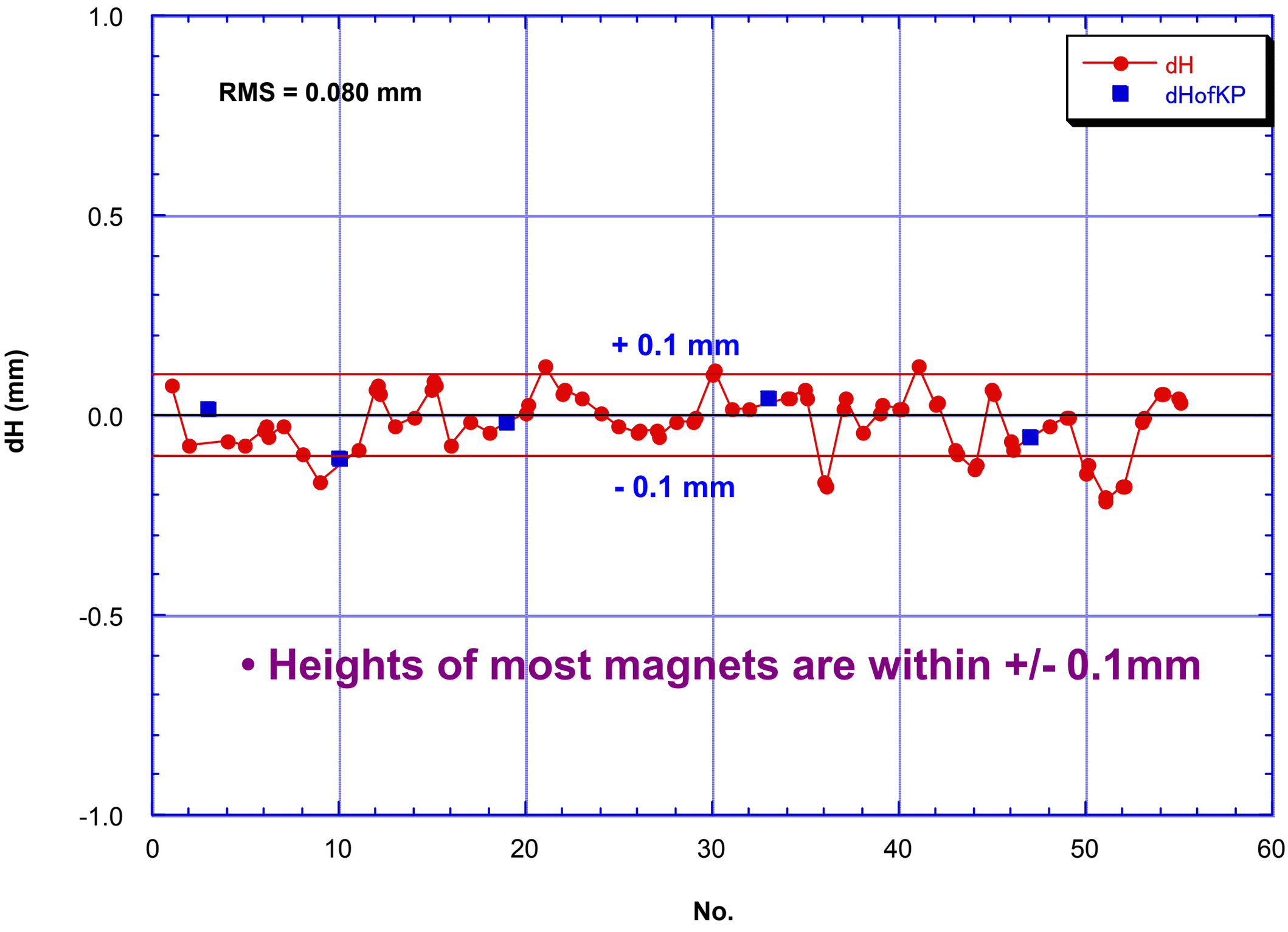
MW0X QD18X

MS1FF

R. Sugahara, 22 October, 2008

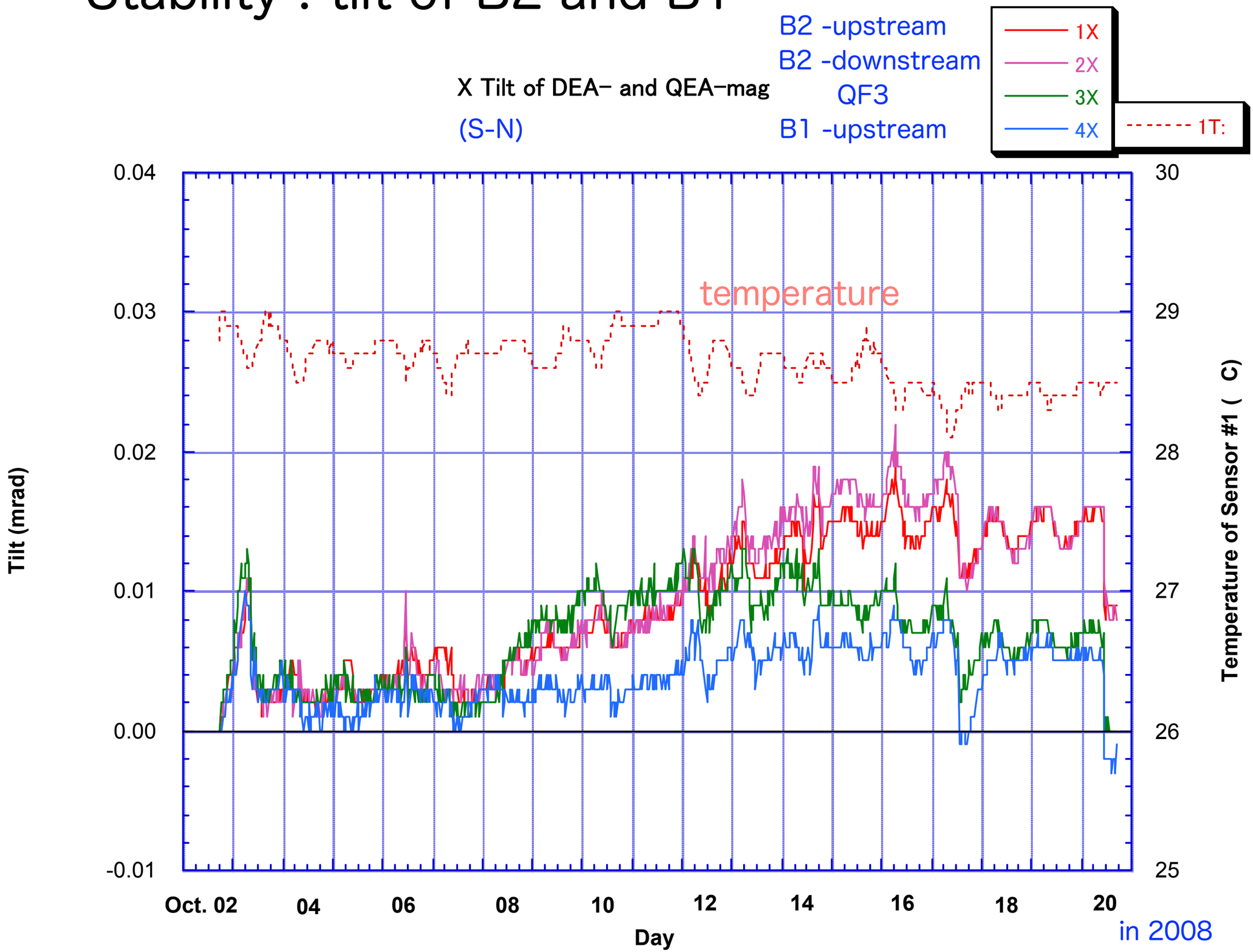
Height Survey after the Second Alignment

September, 2008



Stability : tilt of B2 and B1

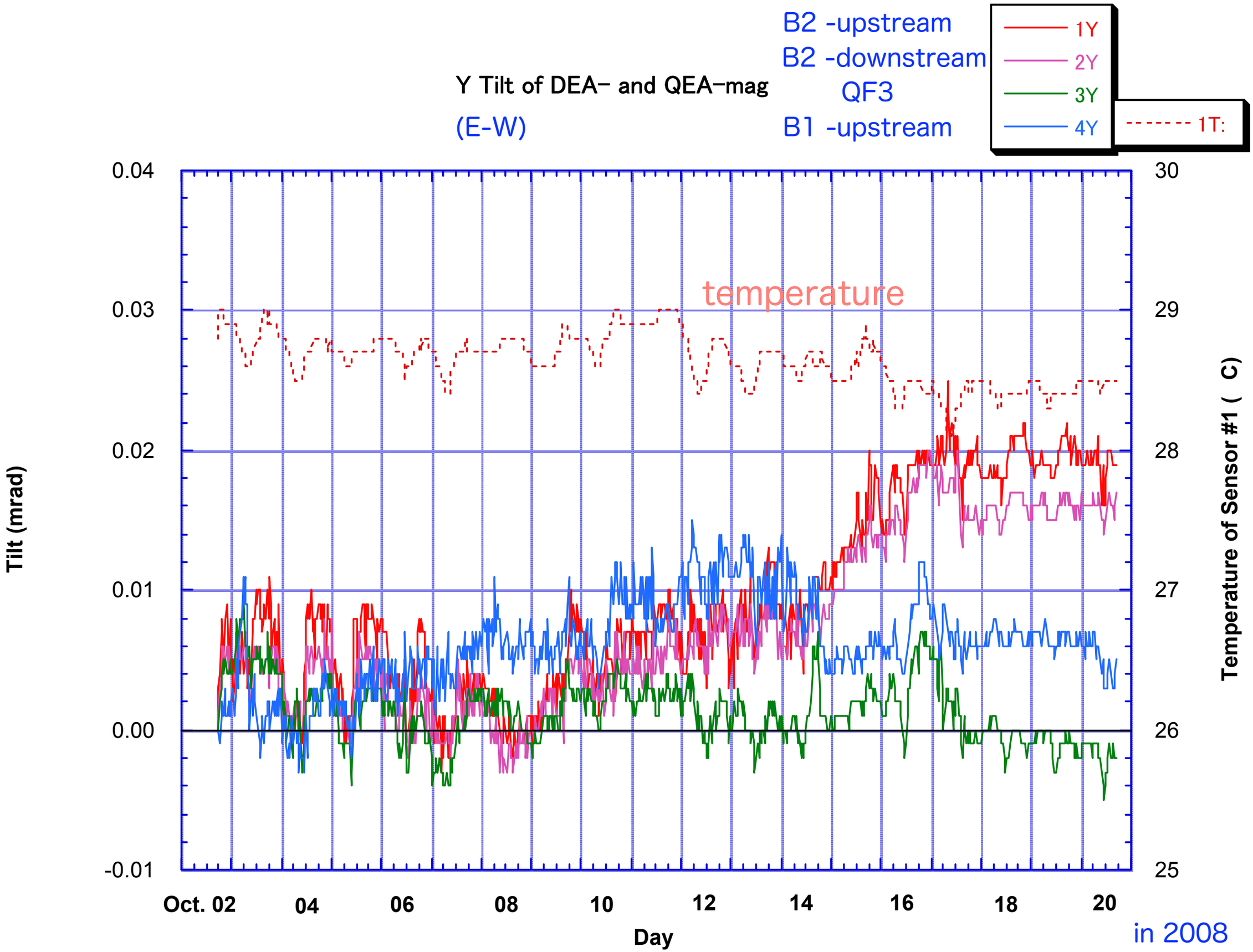
R. Sugahara, 22 October, 2008



Y tilt

Stability : tilt of B2 and B1

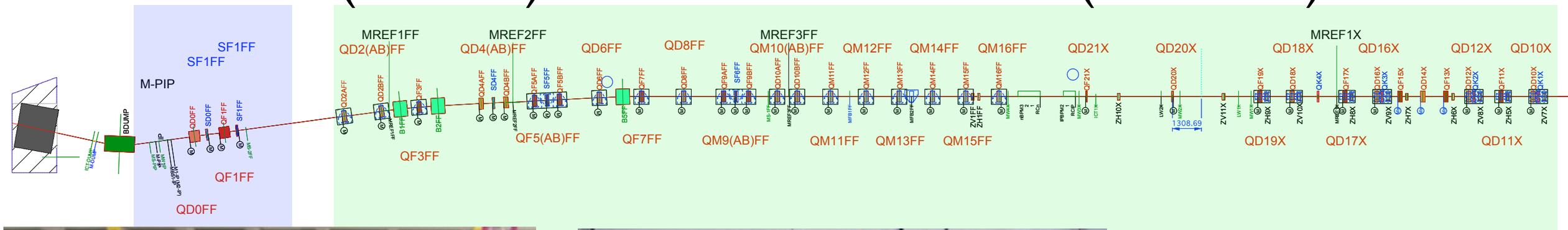
R. Sugahara, 22 October, 2008

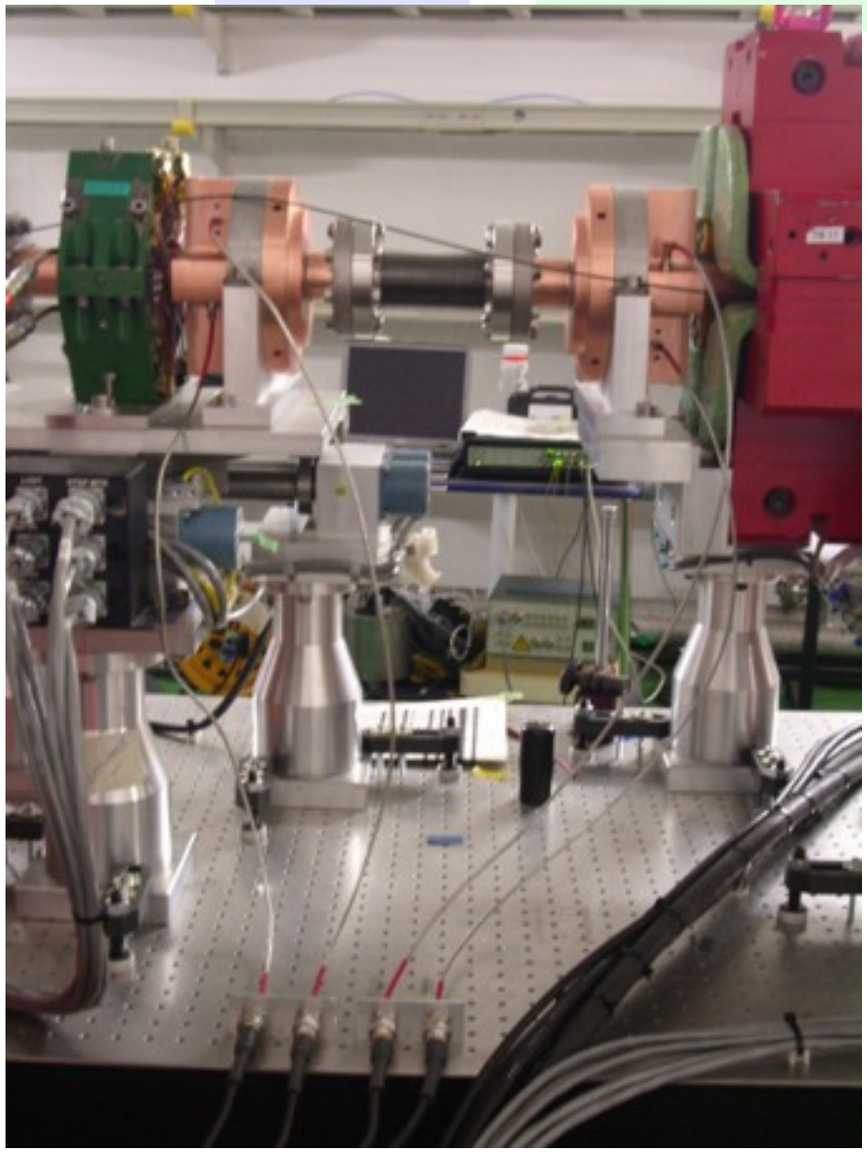


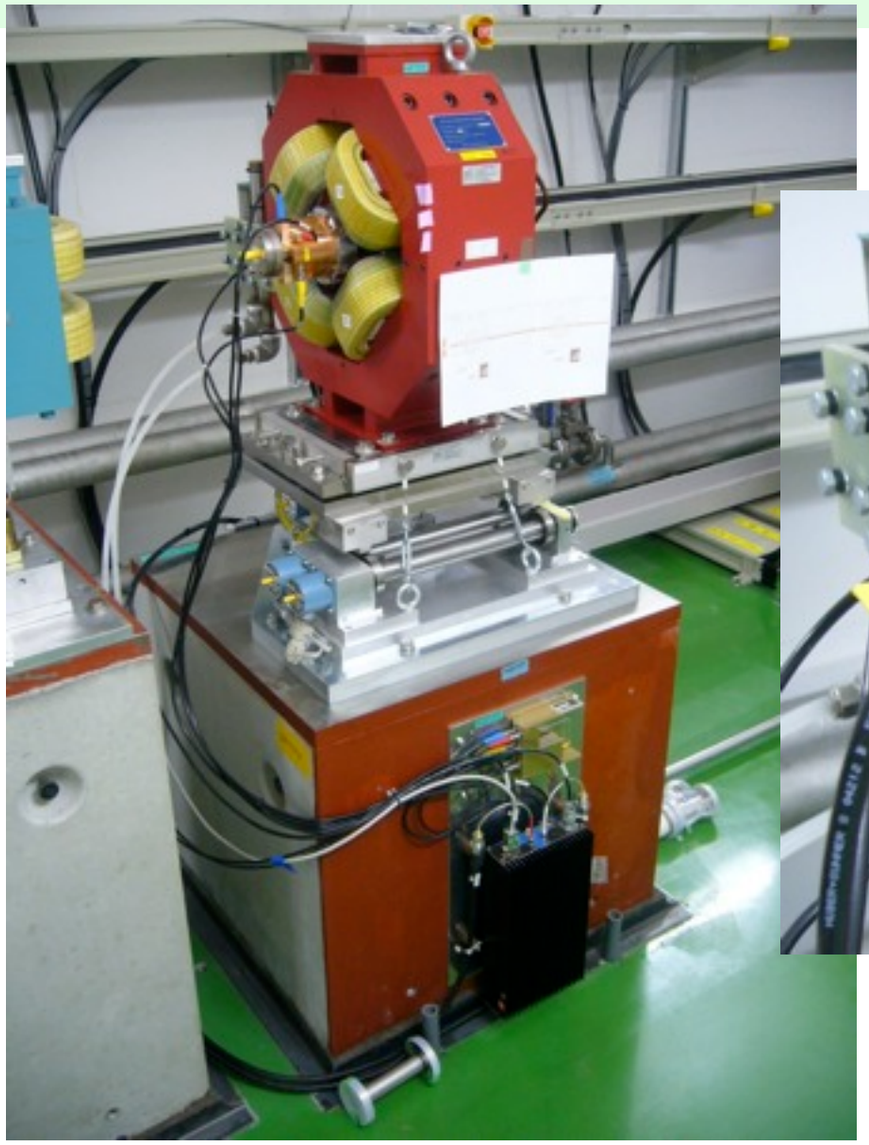
ATF2 BPM layout

S-Band BPMs (4+1 ref.)

C-Band BPMs (33+4 ref.)

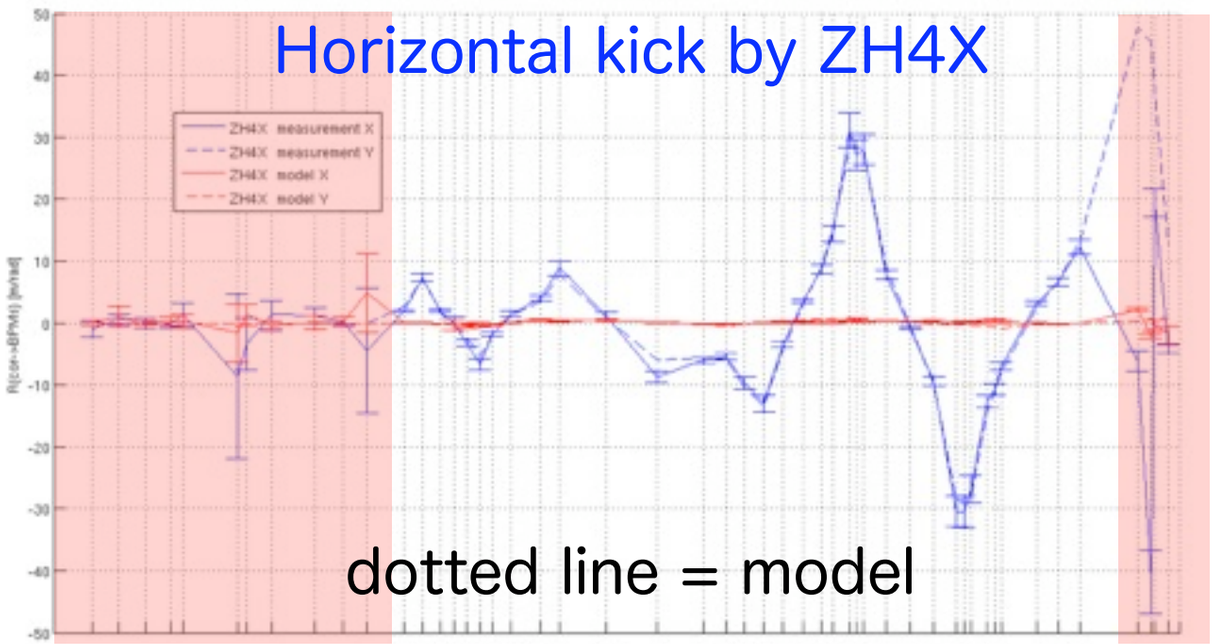


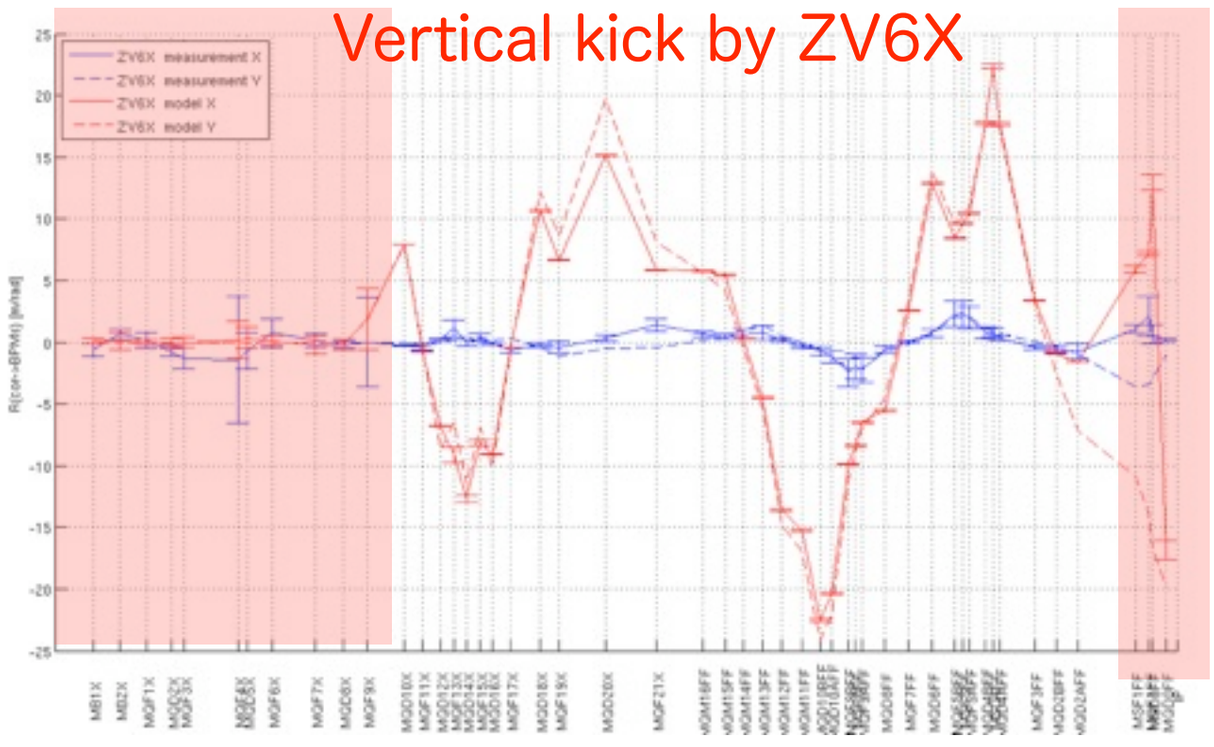




BPM system performance

Y. Renier

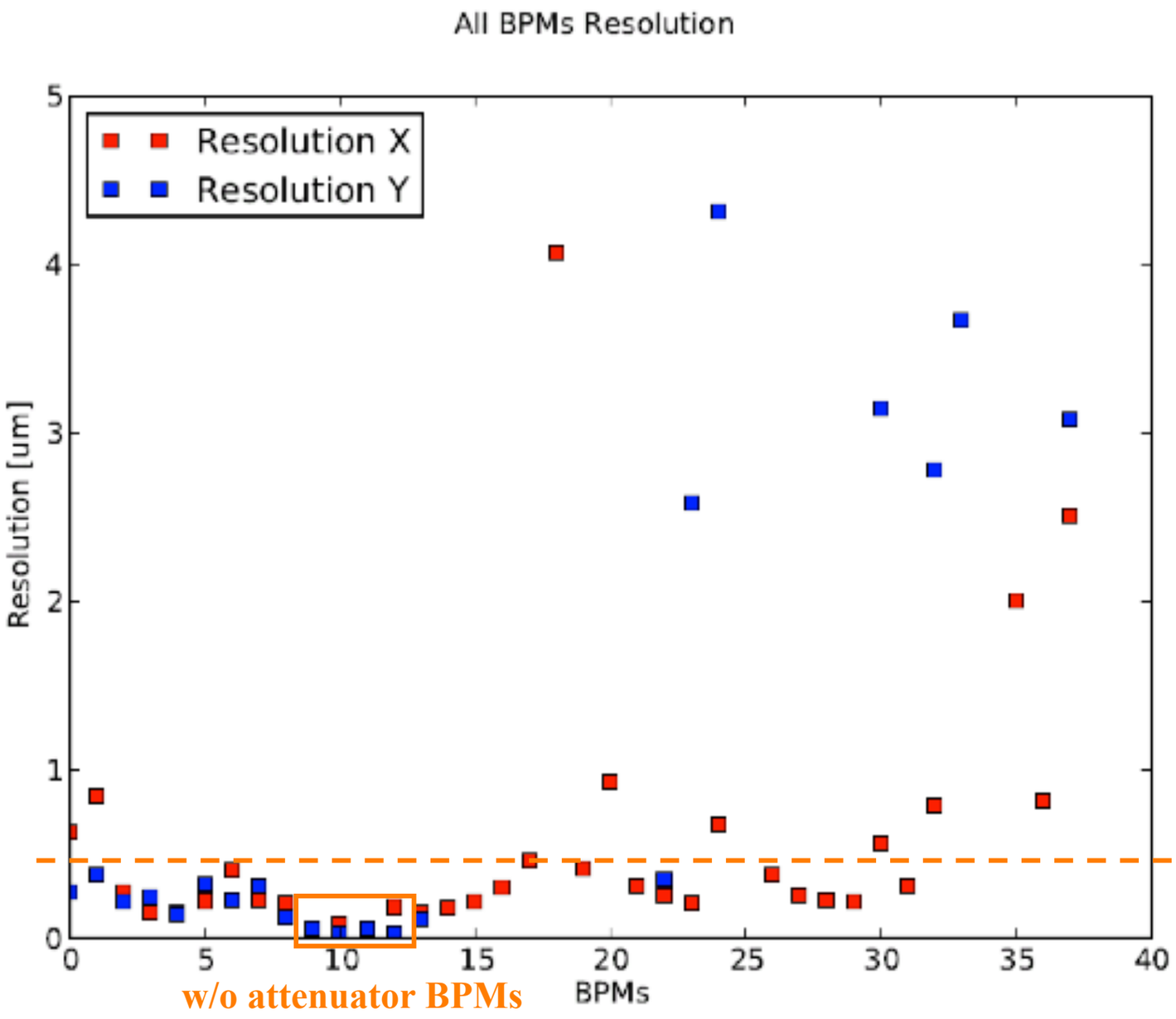


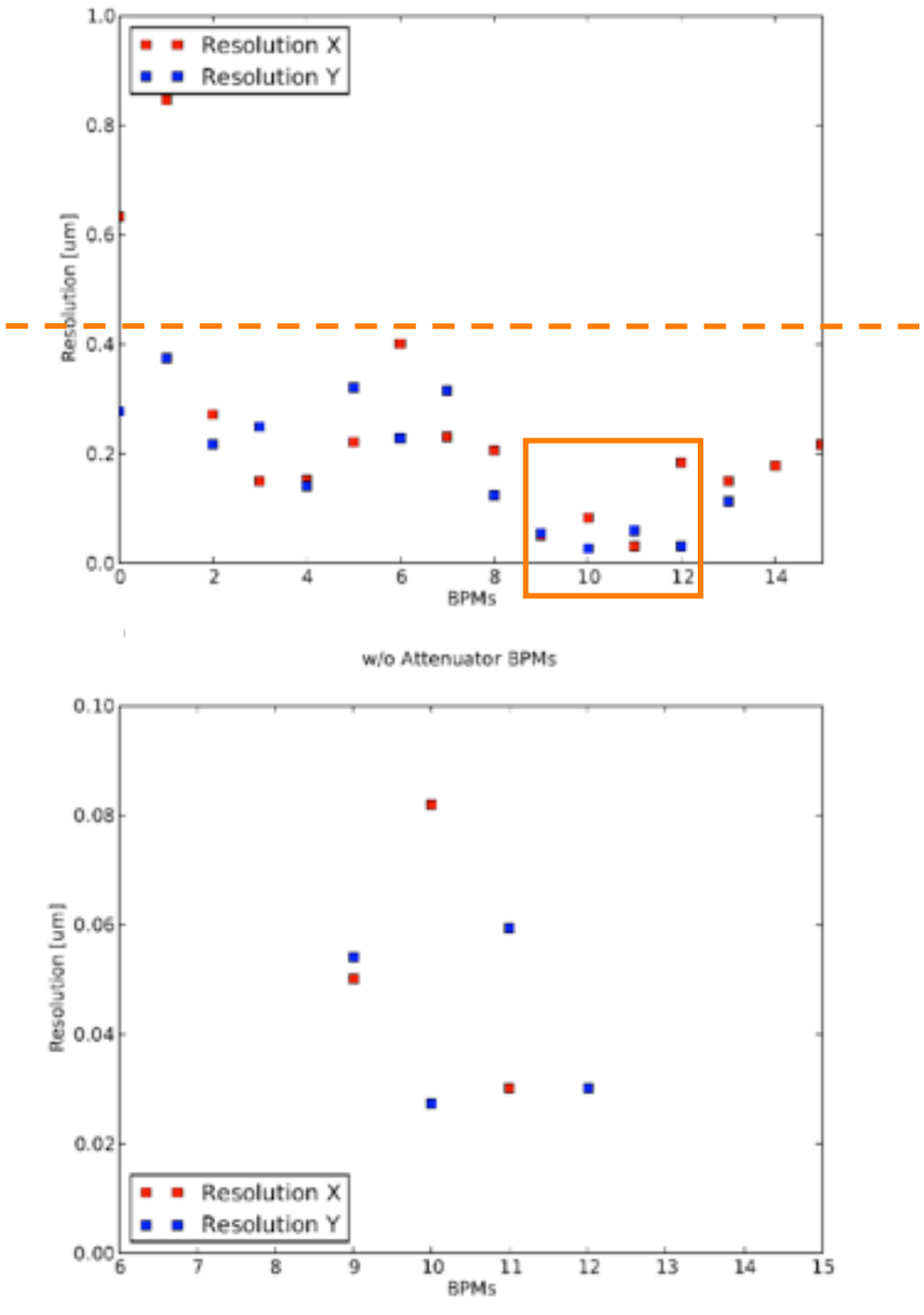


present stability of ~5%
(calibration)

- Kick beam using correctors
  - ZH4X
  - ZV6X
- Compare
  - Optics model (R matrices)
  - Orbit response with BPM measurements normalised by kick strength

All BPM Resolution Determination





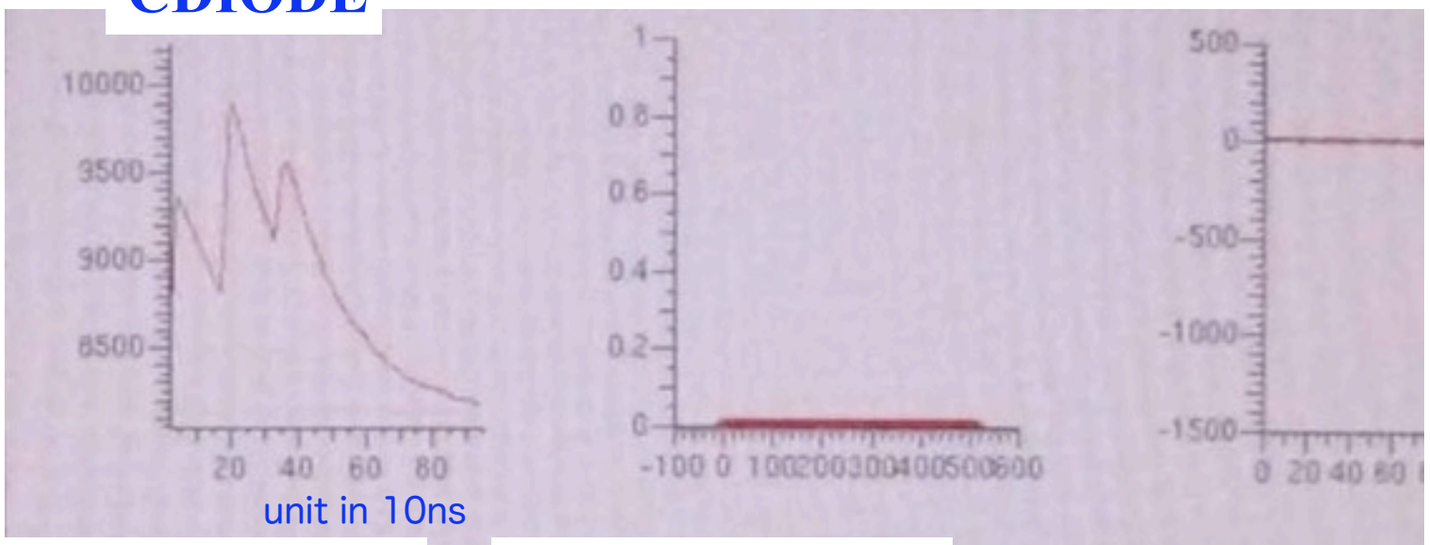
2010.04.27

bluekyi83@knu.ac.kr

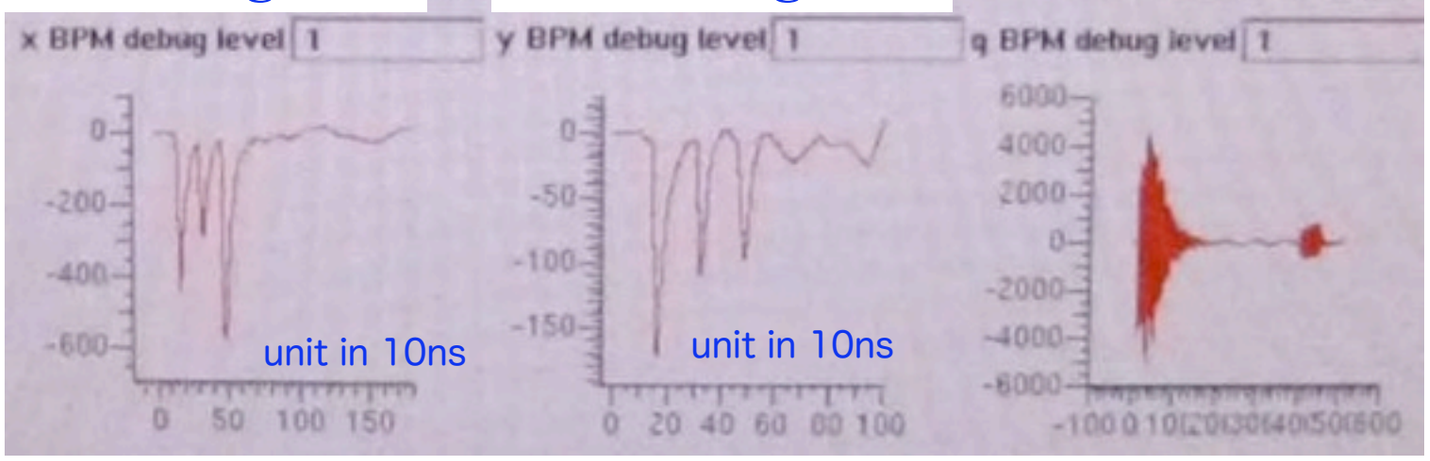
IPBPM performance for multi-bunch beam ;
1 bunch 3 trains

- Clear signal X and Y from diode (KNU electronics, latency 16.07sec measured)
- KNU IP BPM : Low Q BPM : few nsec

CDIODE



IPBPM Signal X **IPBPM Signal Y**



Resolution of IPBPM is under analysis

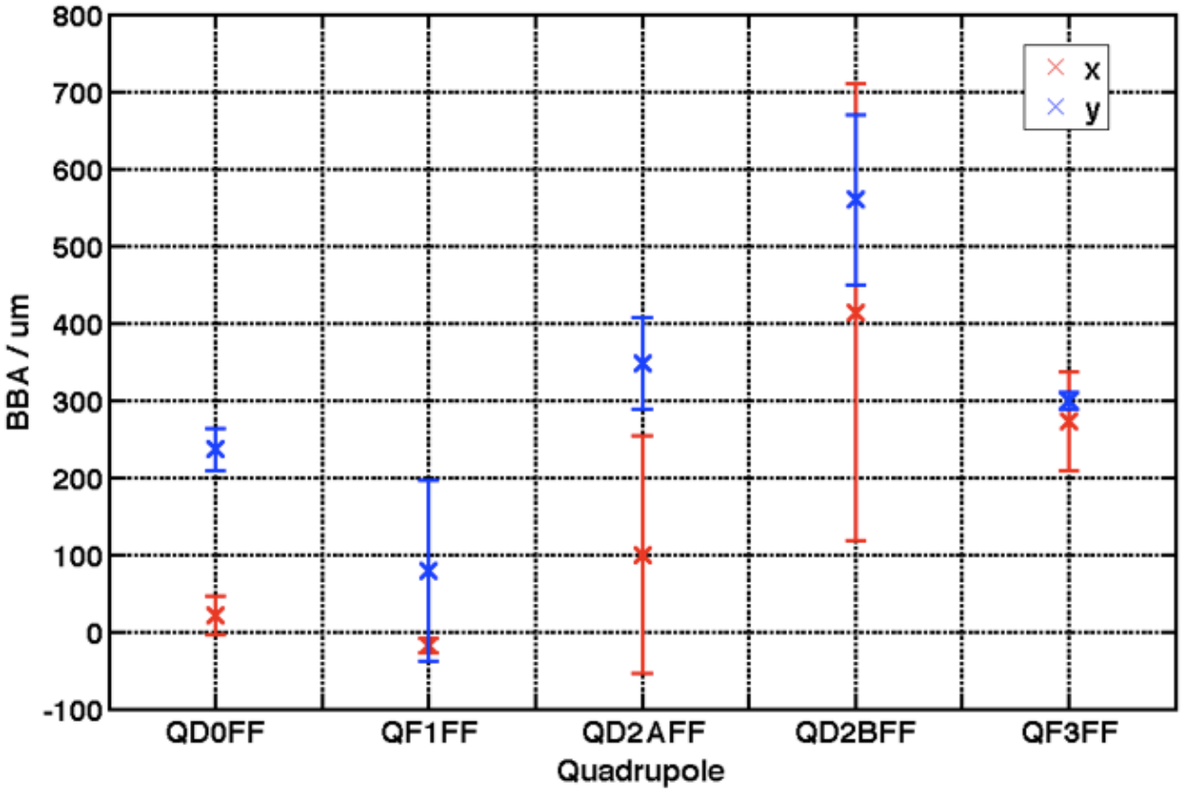
2010.04.27

Beam Tuning Procedure Overview

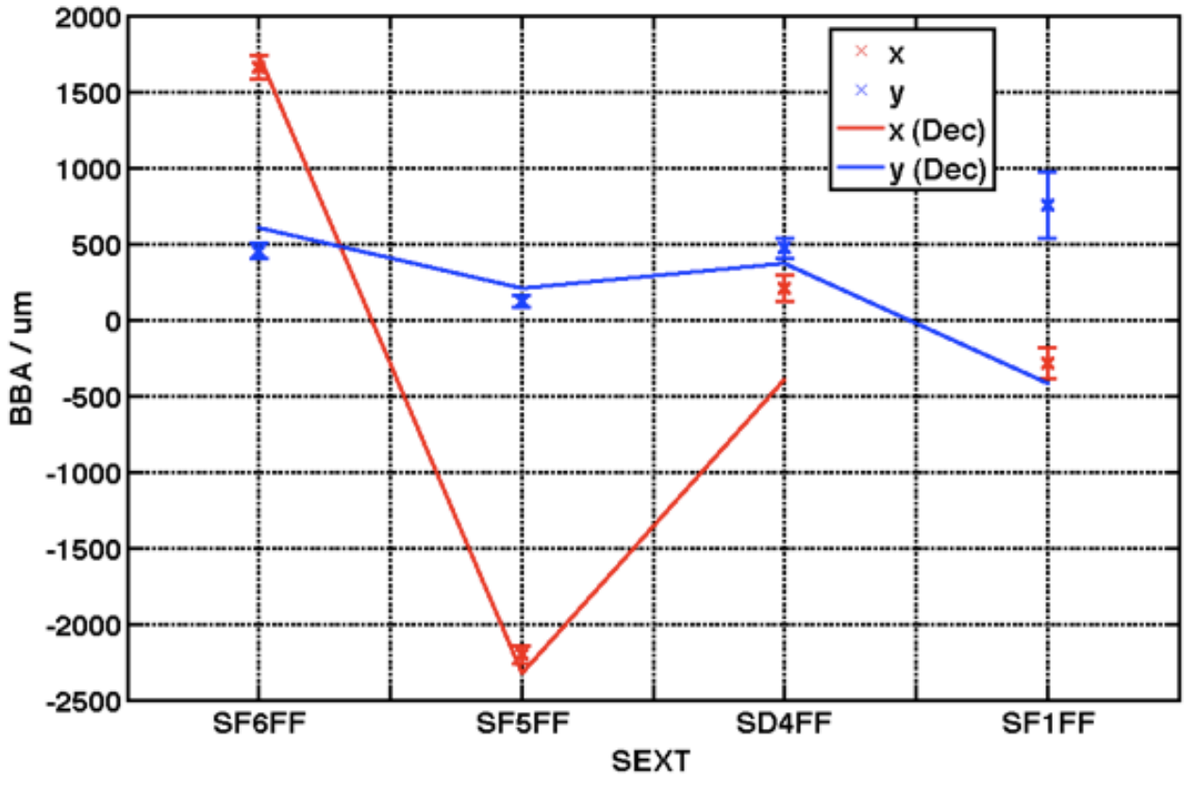
- Use EXT correctors + BPMs (EXT FB) to get orbit through EXT.
- Use FFS FB to get beam through FFS.
- Correct Dy/Dy' in EXT using skew-quad sum knob.
- Correct coupling in EXT using coupling correction system.
- Use FFS FB for launch into FFS.
- FFS Quad BPM alignment using quad shunting with movers.
- FFS Quad mover-based BBA.
- FFS Sext BPM alignment using Sext movers and downstream BPMs.
- Sextupole mover tuning knobs to get final spot size : multi-knobs
  - Vertical IP dispersion and Waist
  - <x'y> coupling
  - Higher order terms collectively through Sext rolls + dK.
- Also use EXT skew-quads to tune other coupling terms.

BBA results , April 2010

the measured magnet center to BPM electrical center



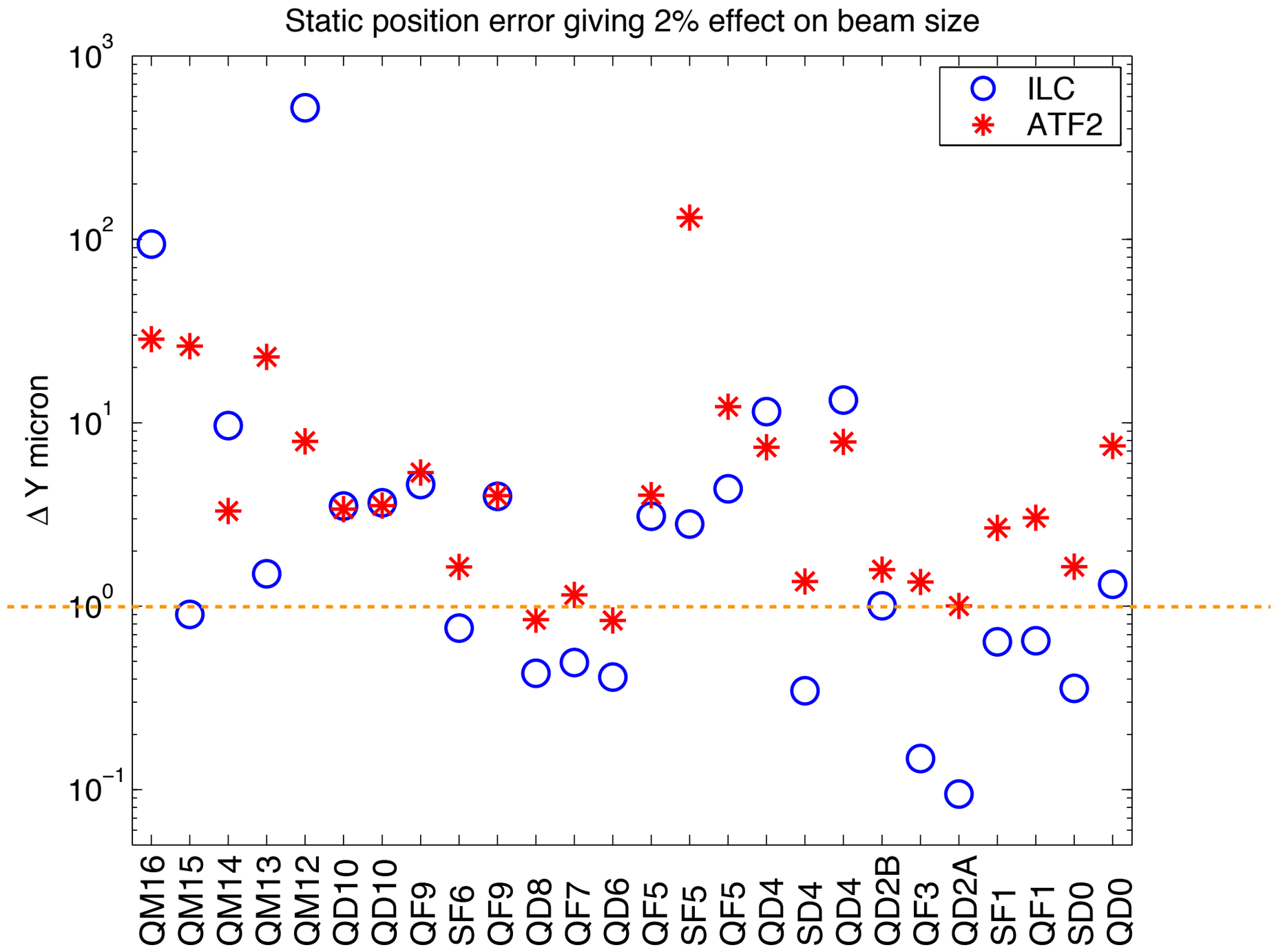
Worst accuracy results were affected by jitter and low intensity. So, the BBA should be repeated.



Mostly good agreement with those in December 2009. Didn't achieve to BBA SD0FF.

Fig. 3.7, ATF2 Proposal, KEK Report 2005-2 etc., Aug. 2005

The BBA errors should be static Δy errors shown.



Therefore, BBA must be improved .

A. Scarfe et al., MOPP030 EPAC08 proceedings

Performance of Orthogonal Tuning Knobs

To correct residual aberrations at IP

by using 5 sextupoles in the final focus system

multi-knobs : <xx>, <xy>, <x'x'>, <x'y>, <x'y'>, <yy>, <y'x>, <y'x'>, <y'y>

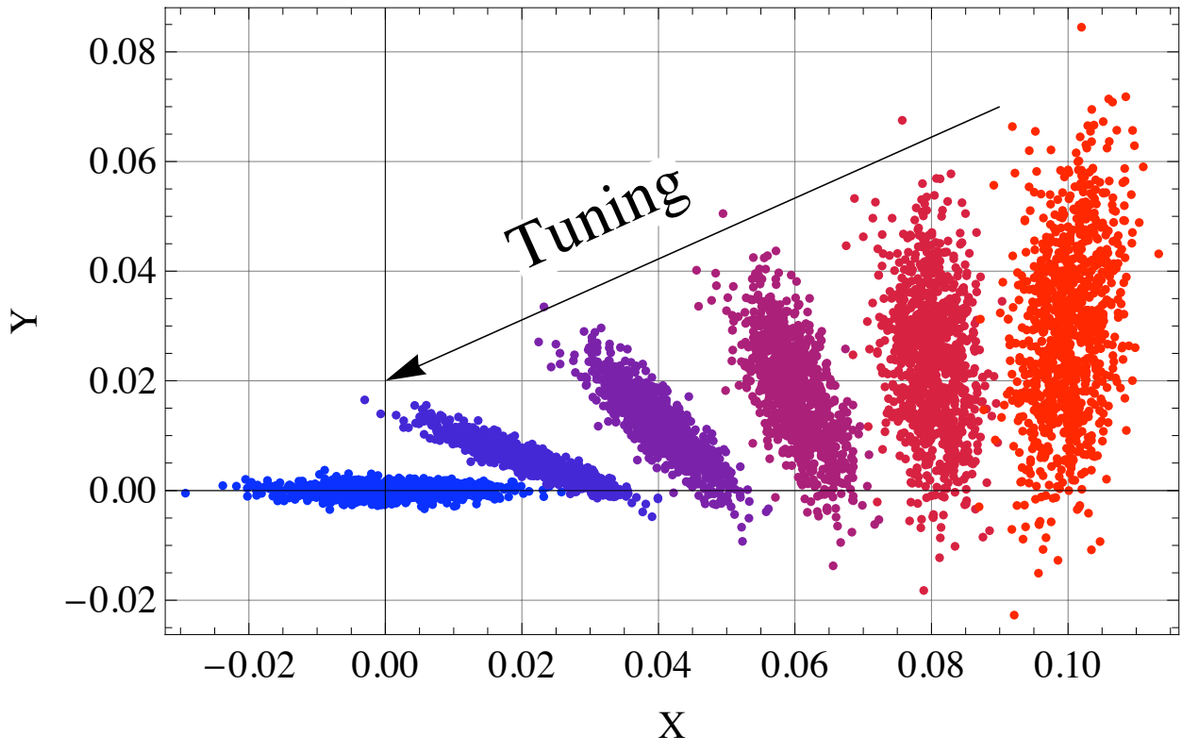


Figure 2: Beam response matrix tuning from the error beam (red) to the nominal beam (blue).

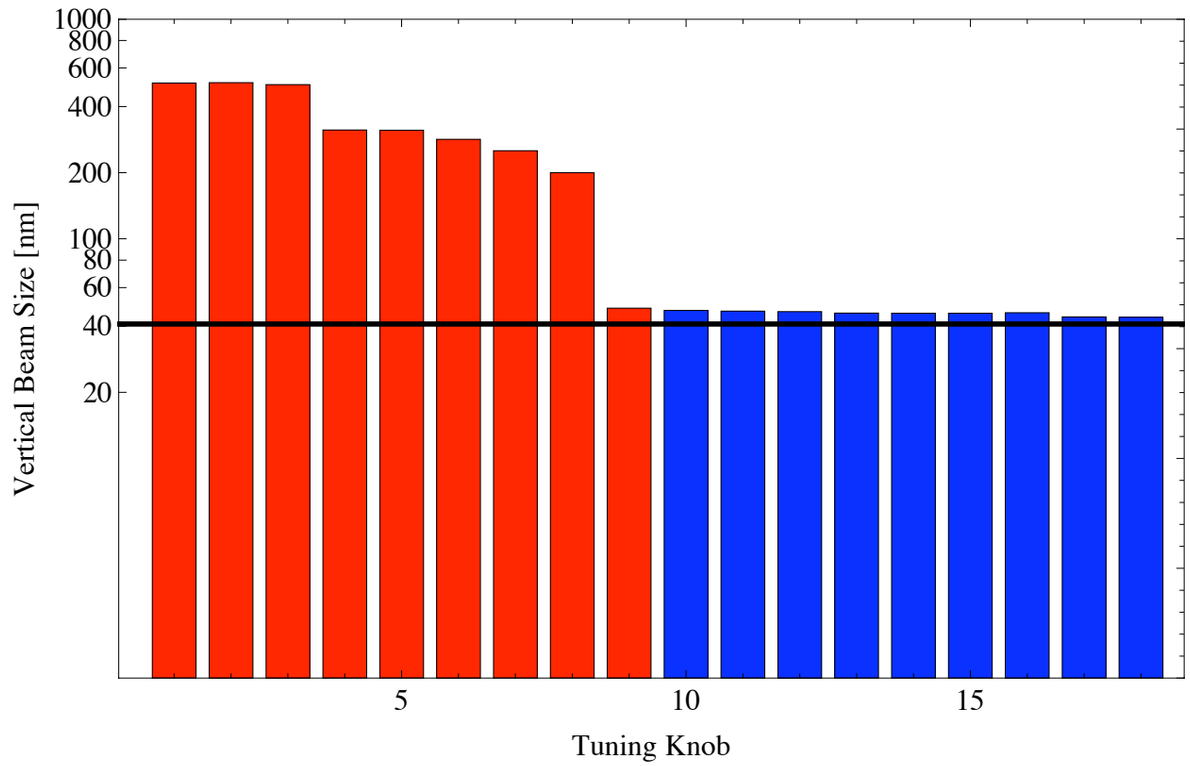
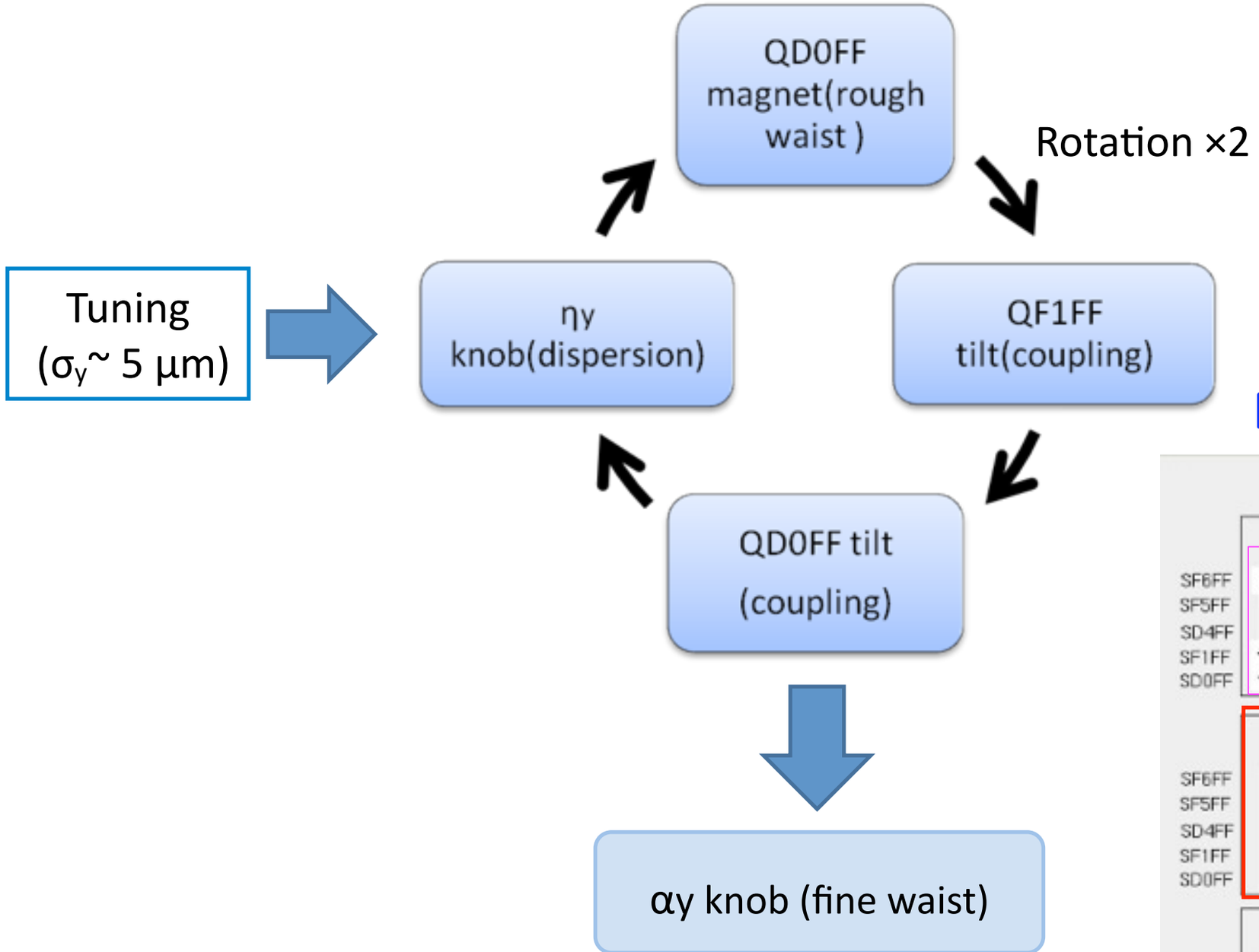


Figure 3: A representative example of vertical beam size tuning using the beam rotation method.

IPBSM Beam Size Tuning scheme

tested multi-knob, 16 April, 2010



then, COUP1 and COUP2

Multi-knob by 5 Sextupoles

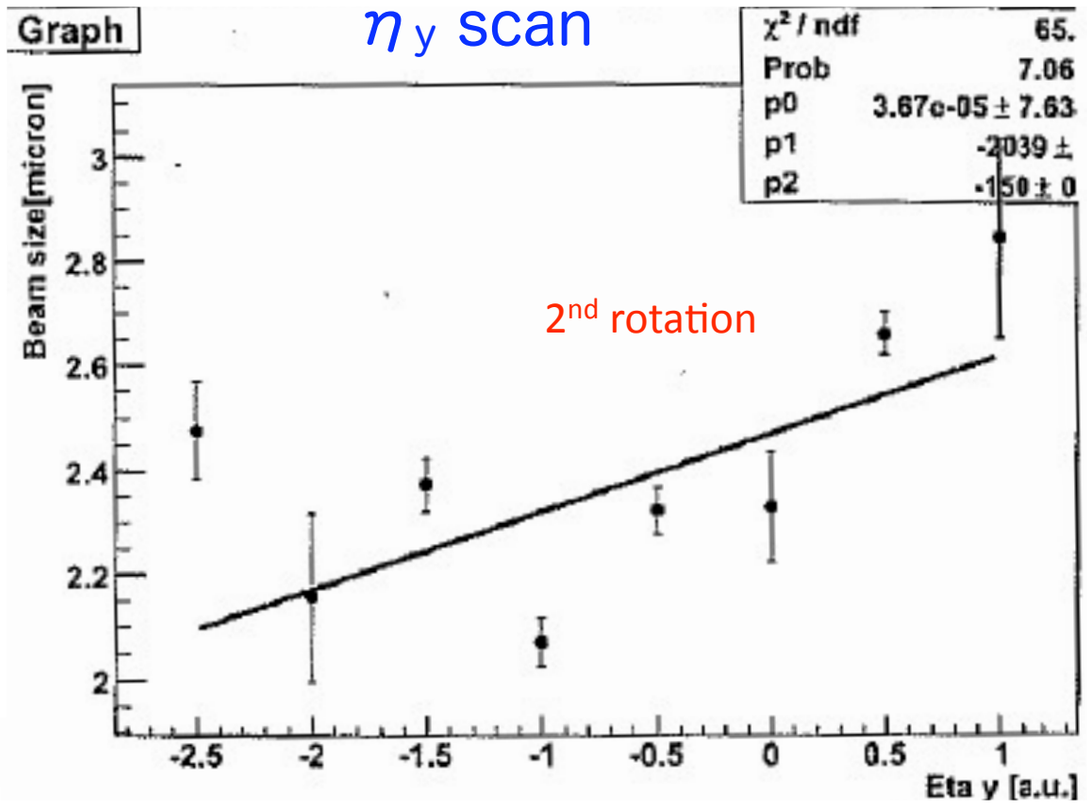
Multi-knob Definition Panel — used (Ay)

	Ax x	Ax y	Ax tilt	Ex x	Ex y	Ex tilt	Ay x	Ay y	Ay tilt
SF6FF	700.0	0.0	0.0	95.0	0.0	0.0	0.0	0.0	0.0
SF5FF	0.0	0.0	0.0	-175.0	0.0	0.0	400.0	0.0	0.0
SD4FF	0.0	0.0	-1.0	0.0	0.0	0.0	0.0	0.0	0.0
SF1FF	-185.0	0.0	0.0	100.0	0.0	0.0	-160.0	0.0	0.0
SD0FF	-300.0	0.0	0.0	-25.0	0.0	0.0	-300.0	0.0	0.0

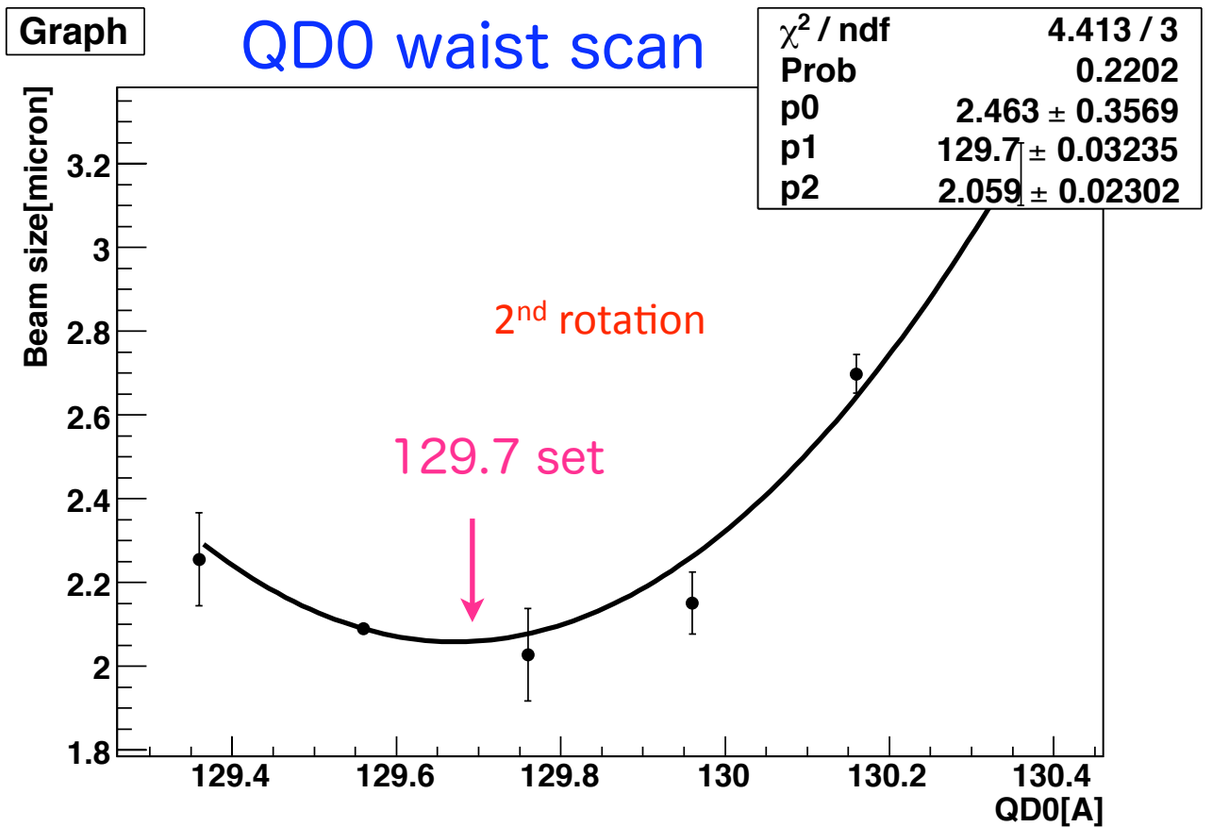
	Ey x	Ey y	Ey tilt	Coup1 x	Coup1 y	Coup1 tilt	Coup2 x	Coup2 y	Coup2 tilt
SF6FF	0.0	-60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SF5FF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SD4FF	0.0	-300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SF1FF	0.0	-230.0	0.0	0.0	200.0	0.0	0.0	0.0	0.0
SD0FF	0.0	300.0	0.0	0.0	0.0	0.0	0.0	200.0	0.0

	Spare1 x	Spare1 y	Spare1 tilt	Spare2 x	Spare2 y	Spare2 tilt	Spare3 x	Spare3 y	Spare3 tilt
SF6FF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SF5FF	0.0	0.0	0.0	0.0	200.0	0.0	0.0	0.0	0.0
SD4FF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	200.0	0.0
SF1FF	-160.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SD0FF	-300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

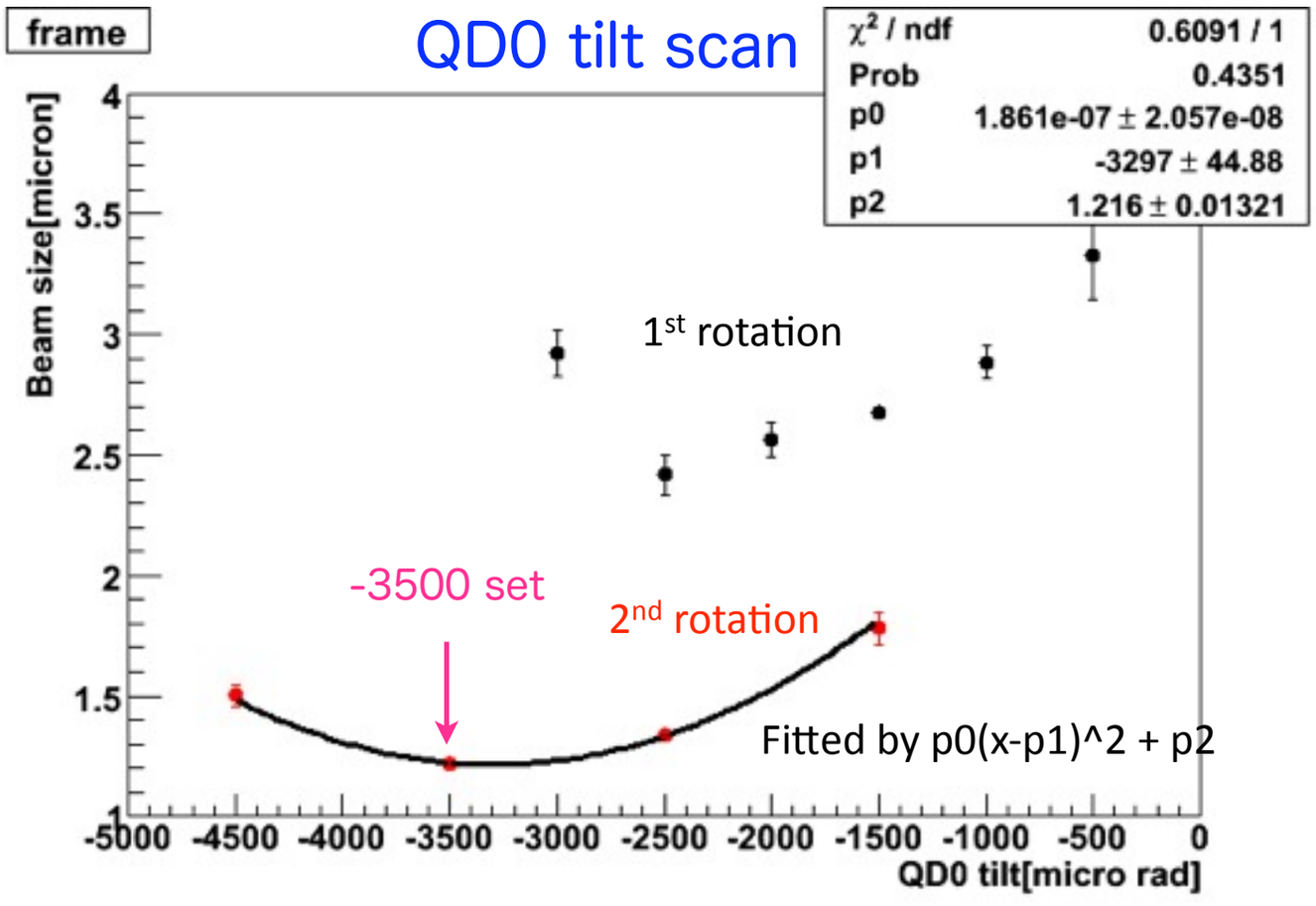
η_y scan



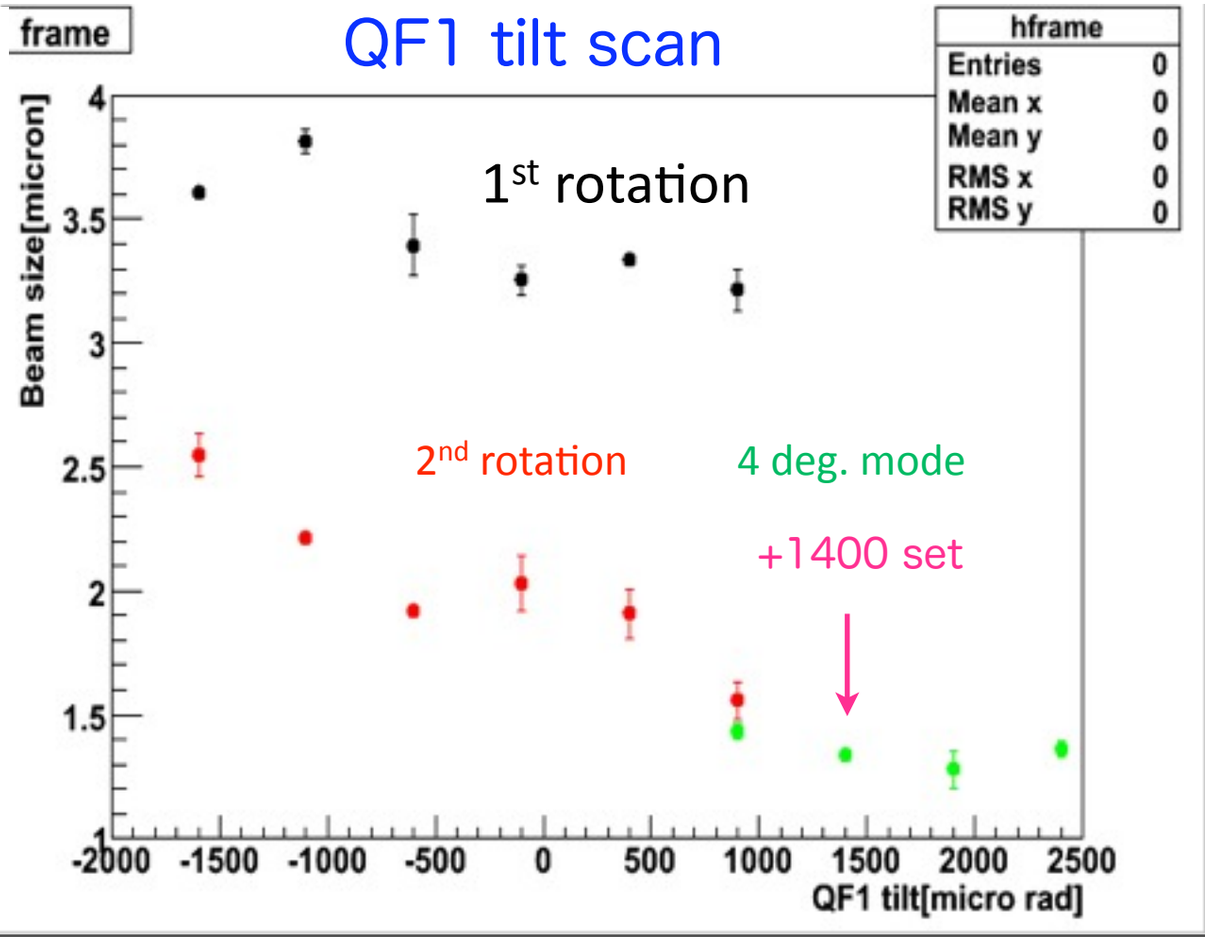
QD0 waist scan

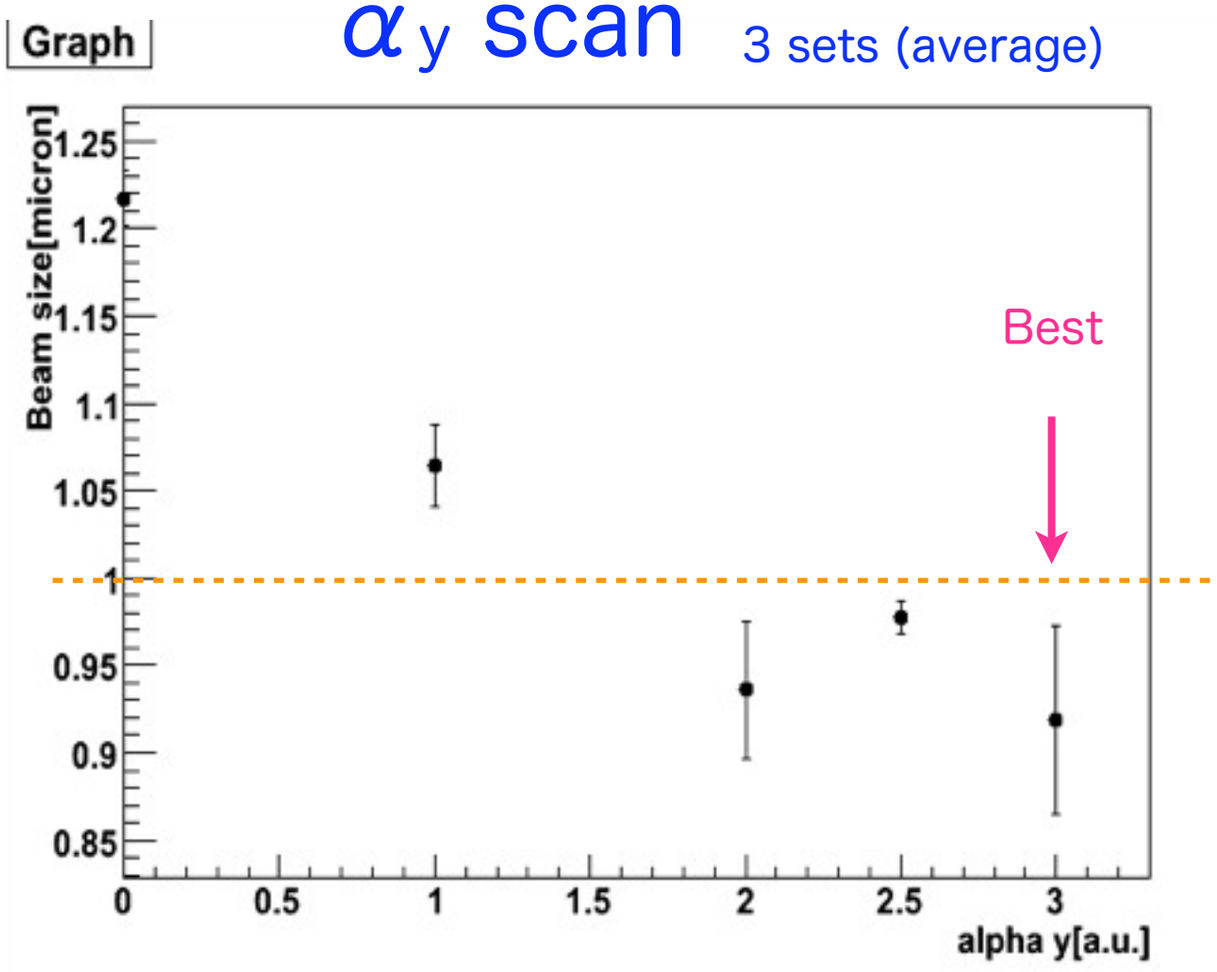


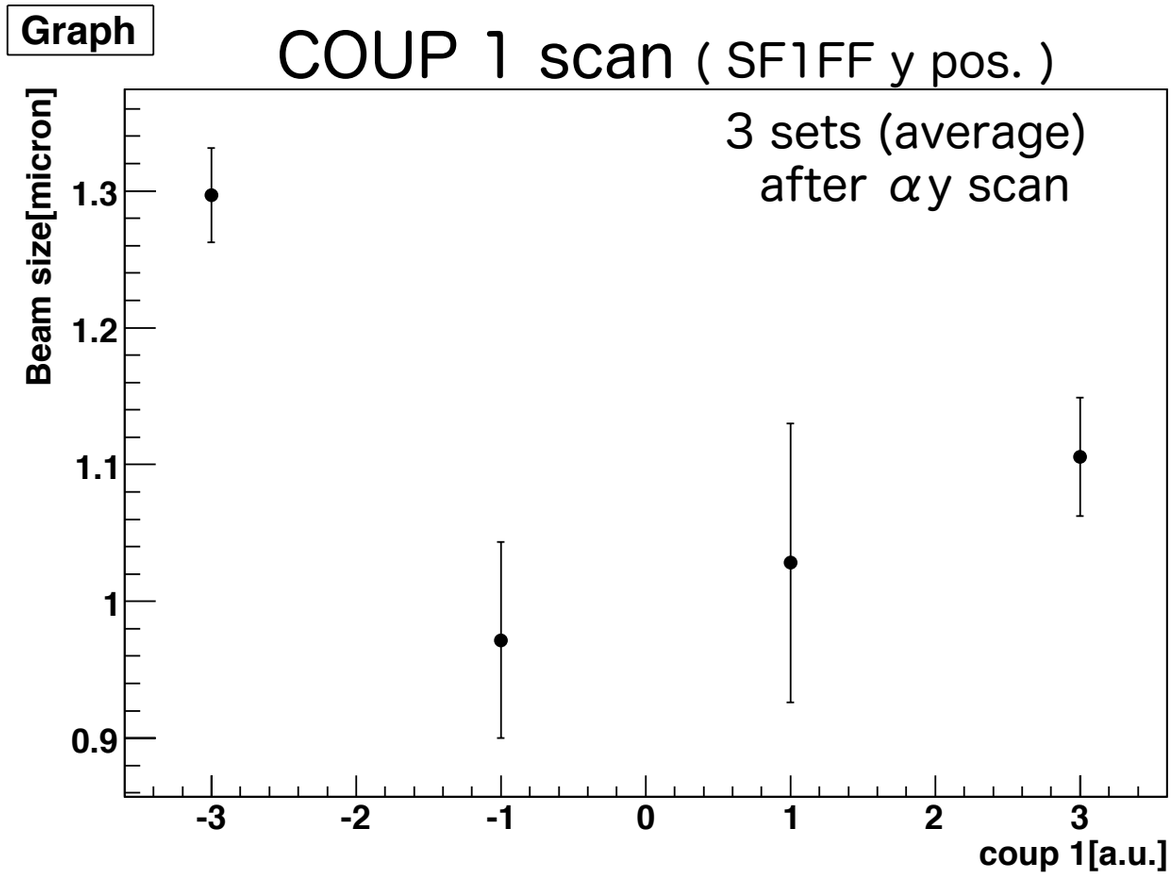
QD0 tilt scan

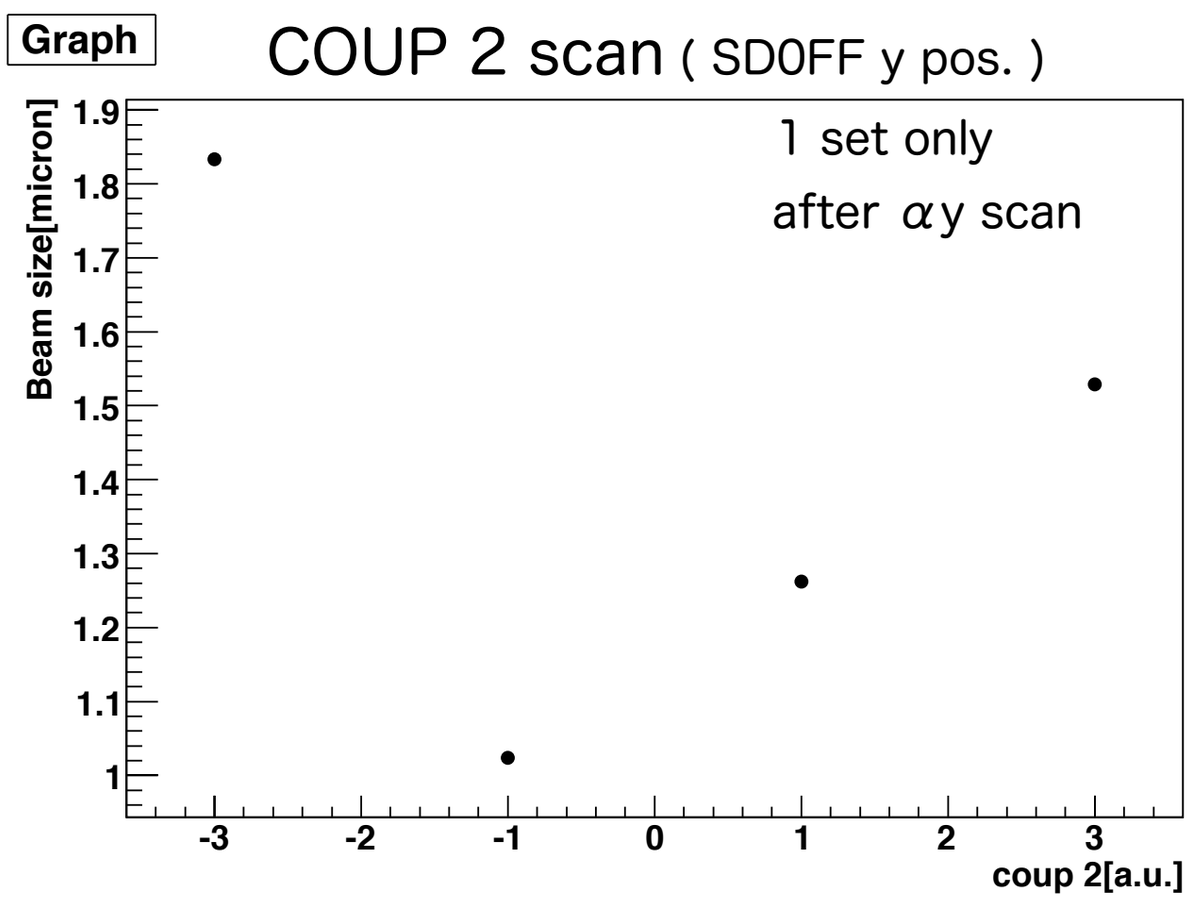


QF1 tilt scan



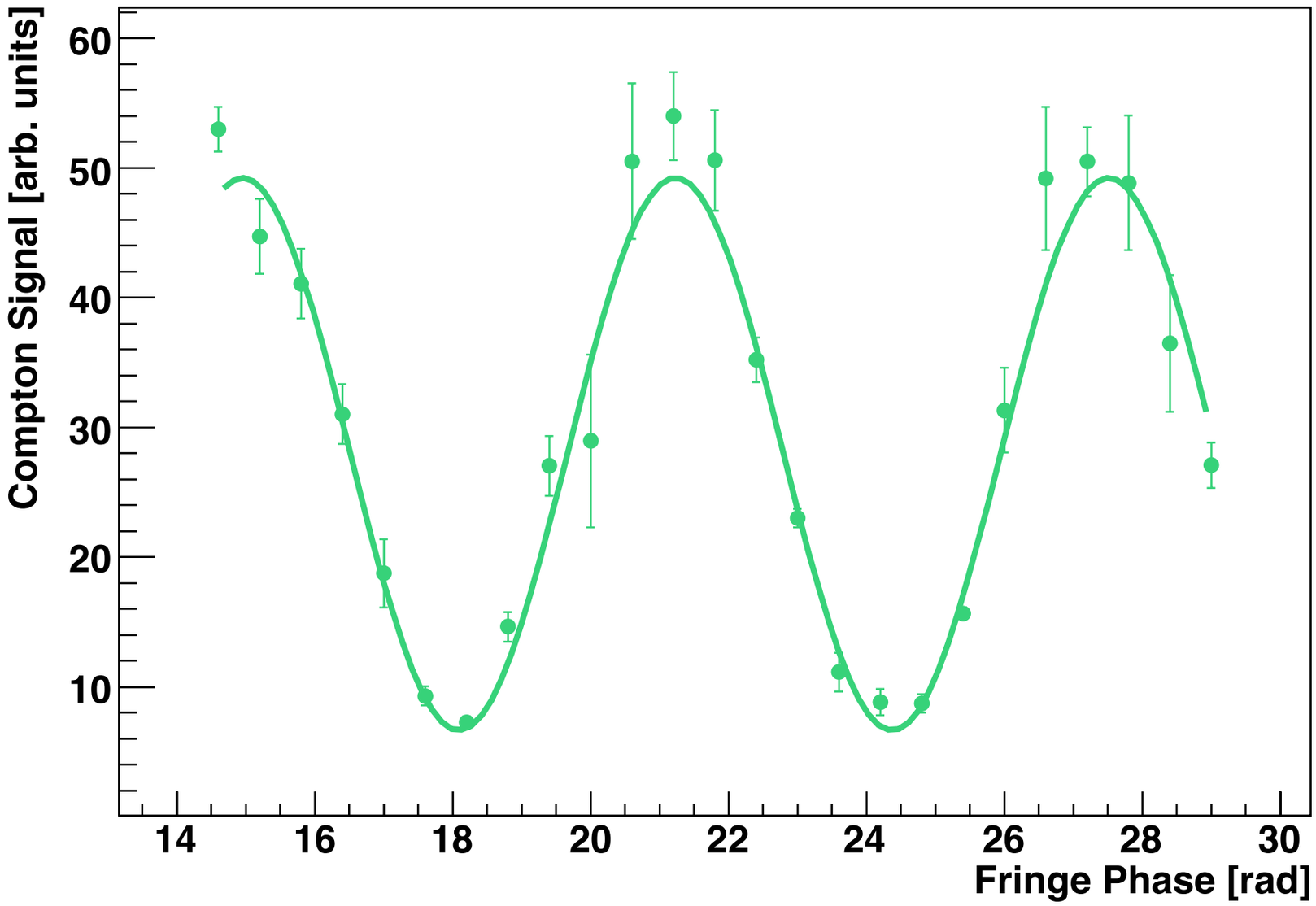

Graph
αy scan 3 sets (average)
Beam size[micron]
1.25
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
0
0.5
1
1.5
2
2.5
3
alpha y[a.u.]
Best


Graph
COUP 1 scan (SF1FF y pos.)
3 sets (average)
after αy scan
Beam size[micron]
1.3
1.2
1.1
1
0.9
-3
-2
-1
0
1
2
3
coup 1[a.u.]


Graph
COUP 2 scan (SD0FF y pos.)
1 set only
after αy scan
Beam size[micron]
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
-3
-2
-1
0
1
2
3
coup 2[a.u.]

Best Results (4 degree mode) in April 2010

Fringe Scan



Crossing angle :4.12 [deg]
Average of 4 bunches/point
Scan range 13.2[rad]
with a step of 600mrad

Fringe Pitch 7.4um

Modulation = 0.767± 0.020
σy = 855 ± 42 nm

Results of Pre-continuous run

for 3 shifts , 21-22 April, 2010

Goal : to achieve 3um beam size without the multi-knob

Optics : 10 times β^*,
with previous settings of QF1X and QF6X (dispersion cor.),
and all FFS sextupoles OFF

Alignment of FD : +1400ur@QF1 and +700ur@QD0

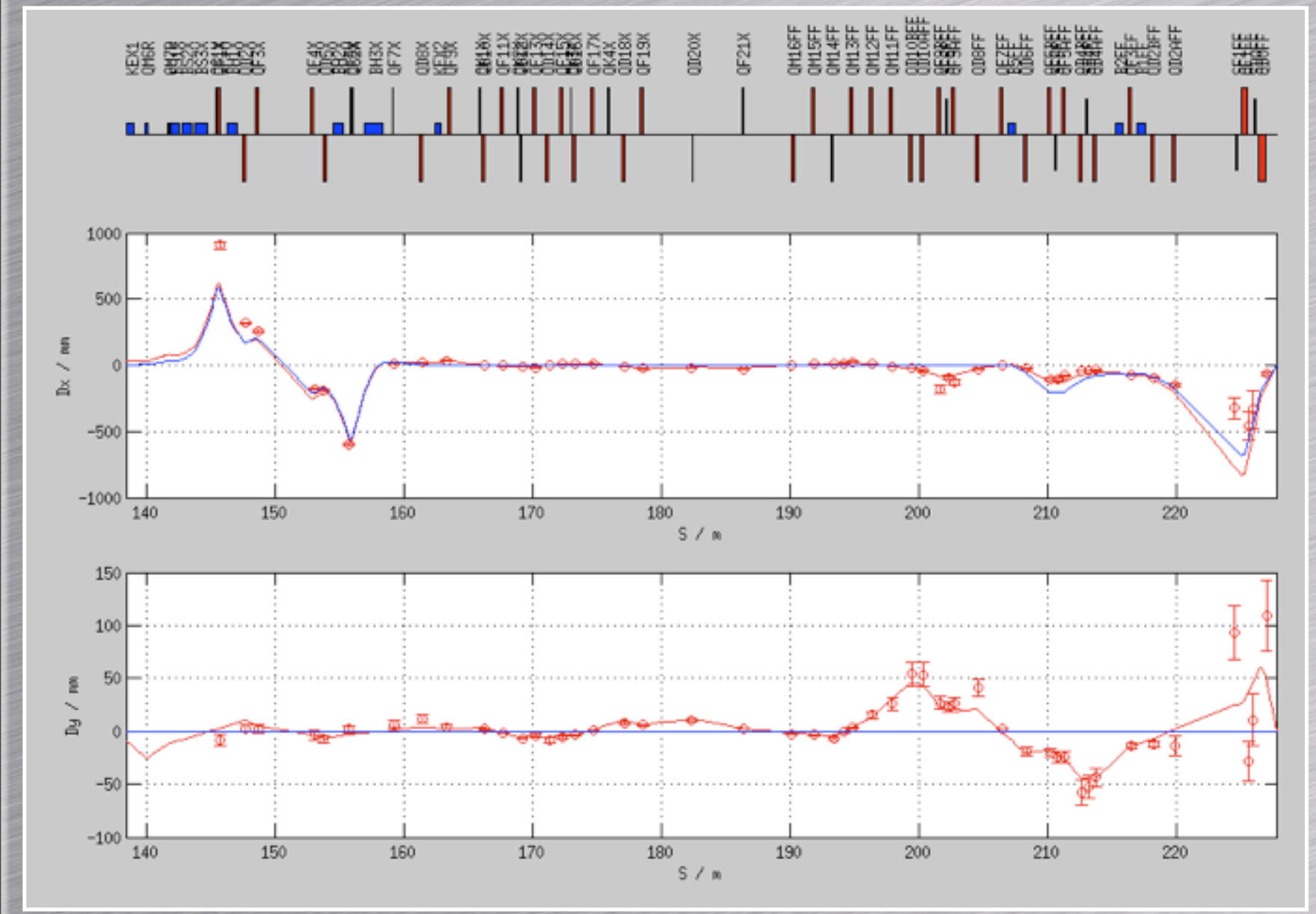
note : beam orbit centered in the IPBPM with horizontal bump
since the shoulder was observed in X.

Procedures as ;

1. BBA
2. Dispersion measurements
3. EXT diagnostics (emittance and twiss measurements)
4. EXT wire scanners (10um dia. tungsten wires)
5. IP + Post IP (PIP) diagnostics
   (emittance, twiss and beam size measurements)
6. IPBSM for IP , 10um dia. tungsten wire scanner for PIP

G. White, ATF Operation Meeting, 23 April, 2010

Initial Dispersion Measurement

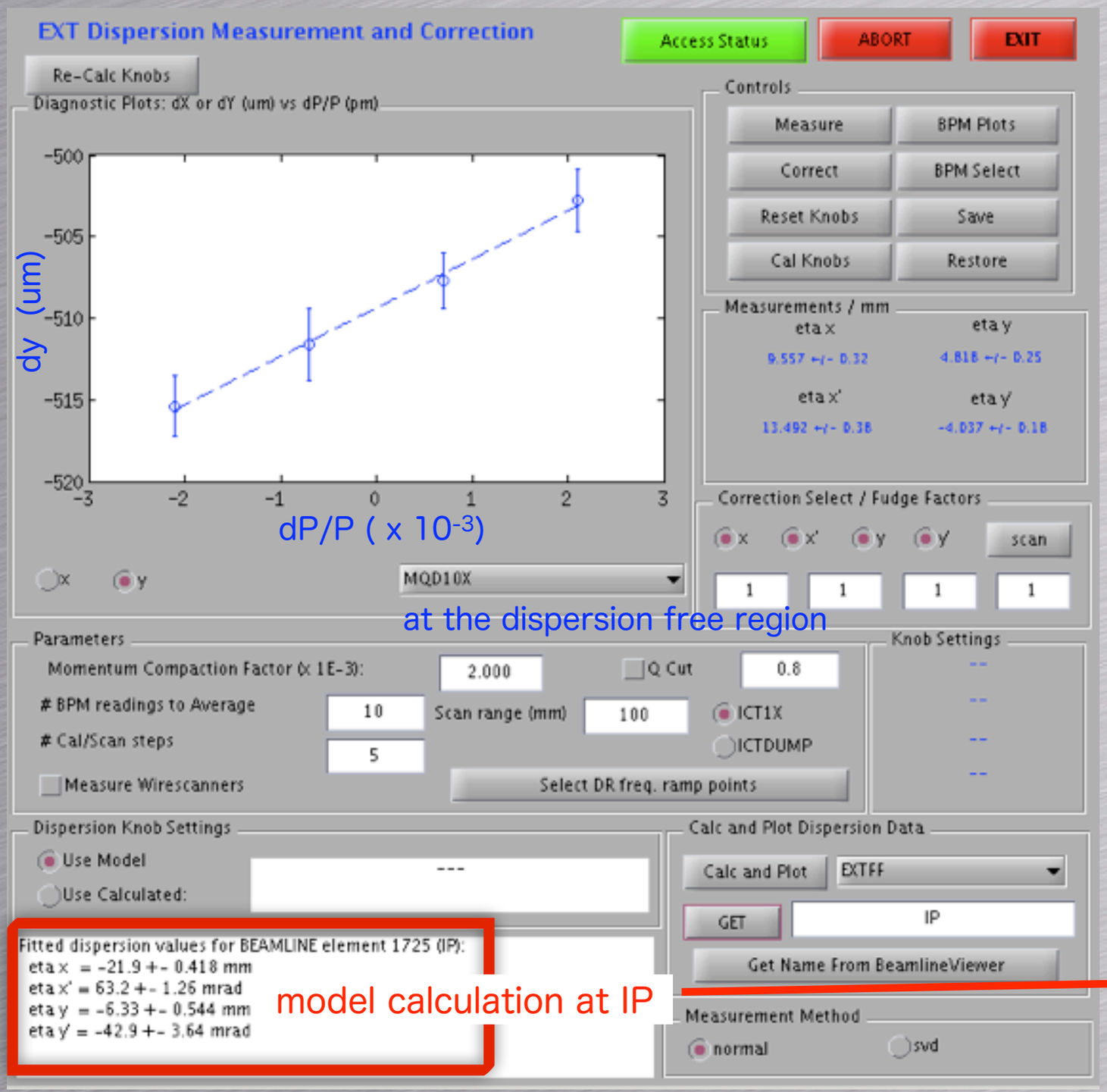


Red = measurement

Blue = model

- Low dispersion measured from last weeks settings.

Model Dispersion Fit to IP

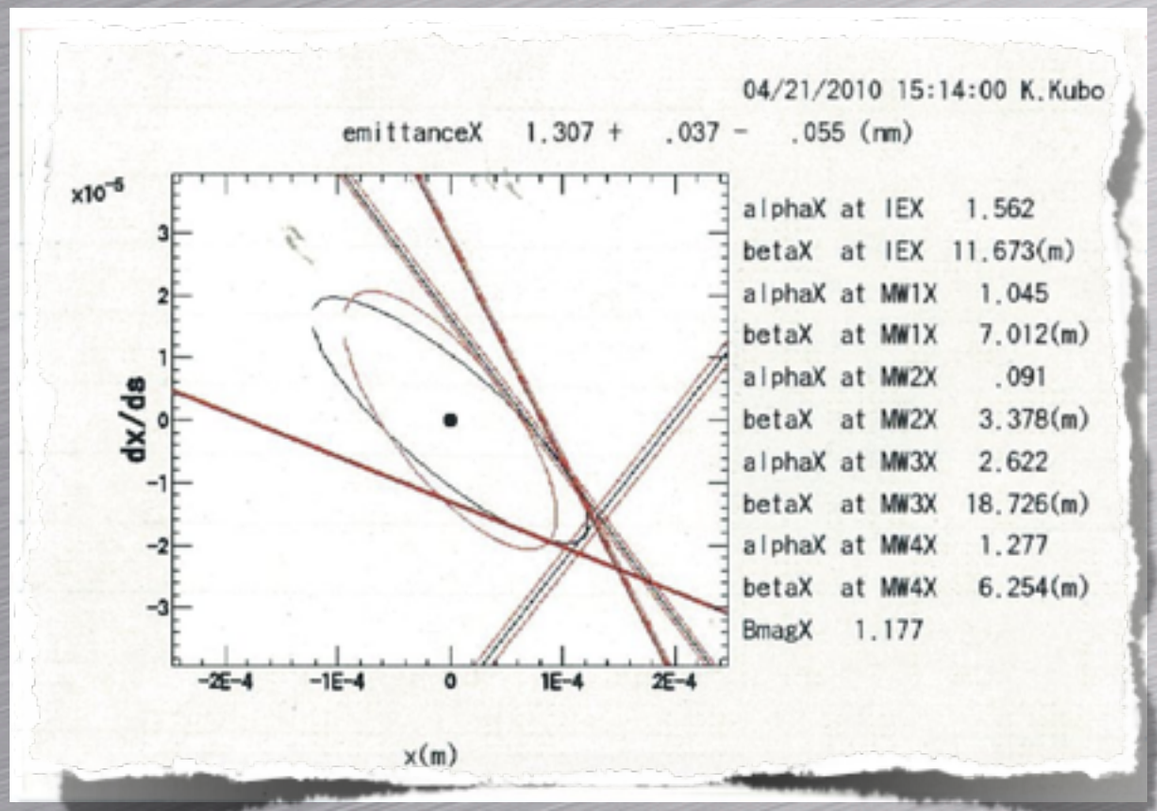


- Horizontal dispersion measured by IPBSM = -18mm D^*_x
- Model fit to BPM dispersion measurements close to IPBSM measurement.

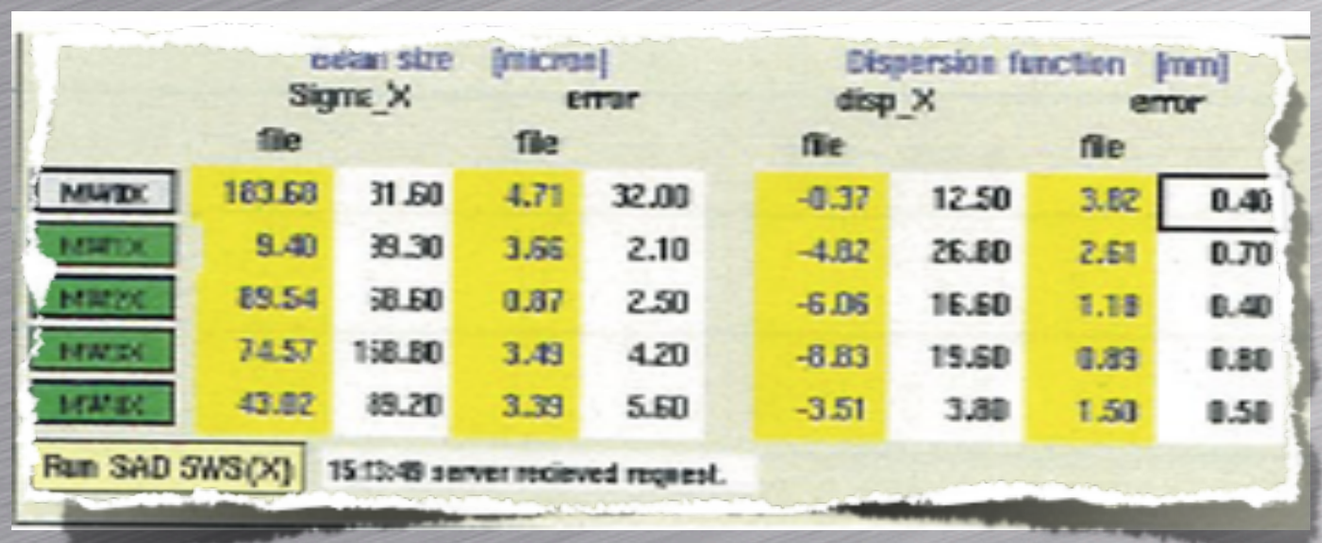
$D^*_x = -21.9 \pm 0.4$ mm

$D^*_y = -6.33 \pm 0.54$ mm

EXT WS Horizontal Measurements

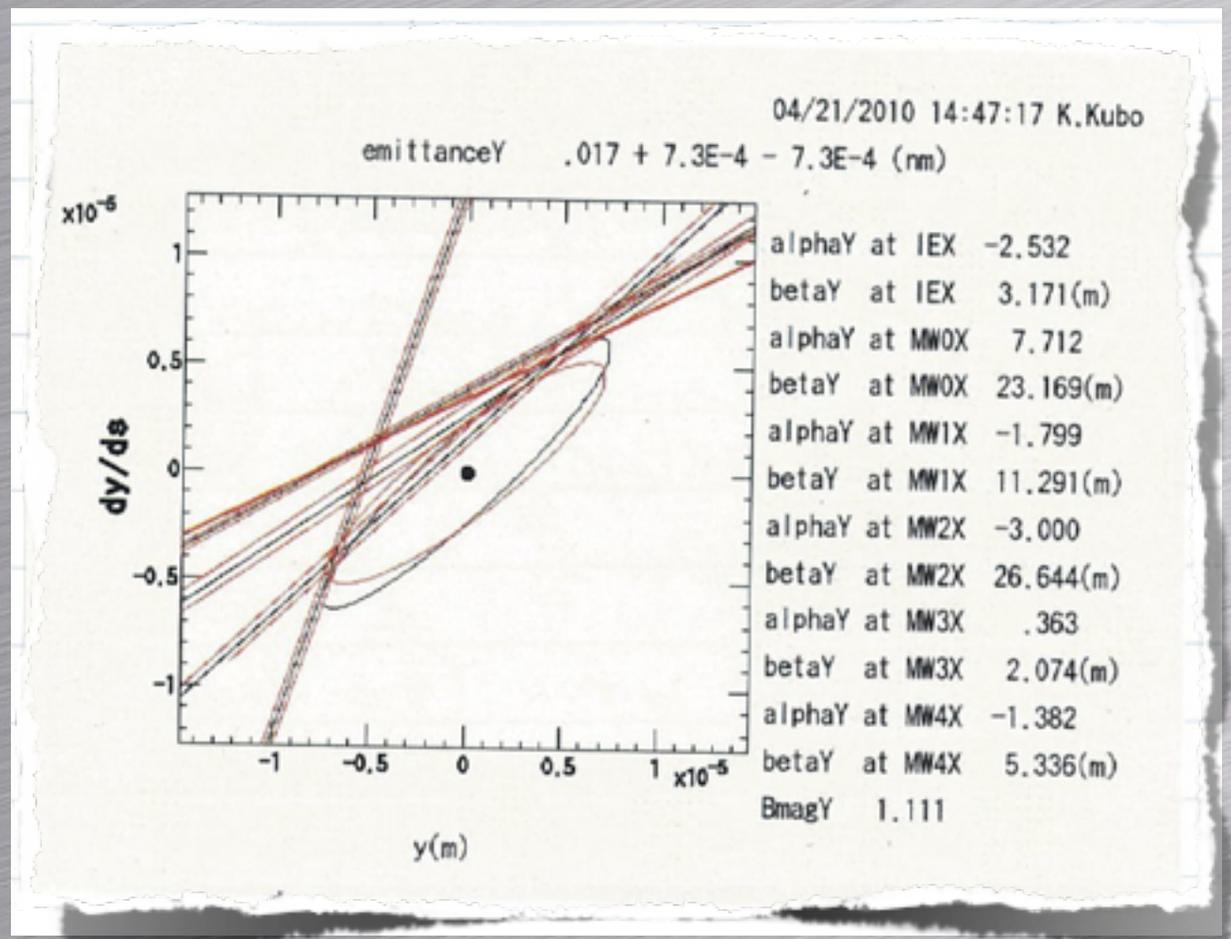


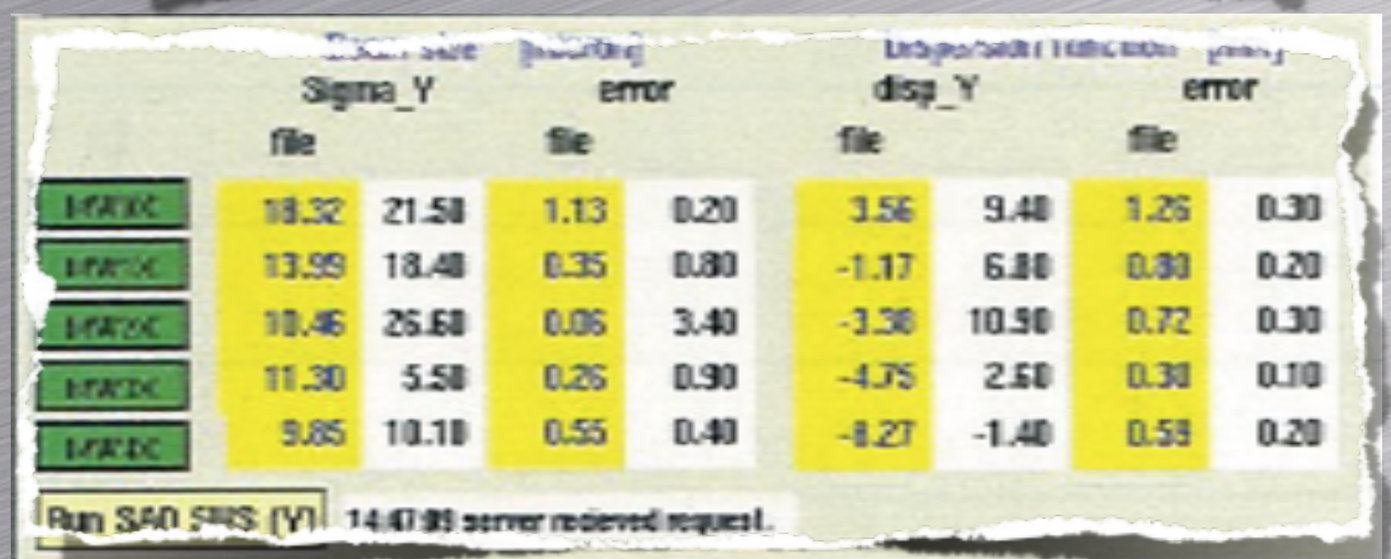
- 1.3nm ε_x emittance
- BMAG=1.2



- Use model fitted dispersion values

EXT WS Vertical Measurements

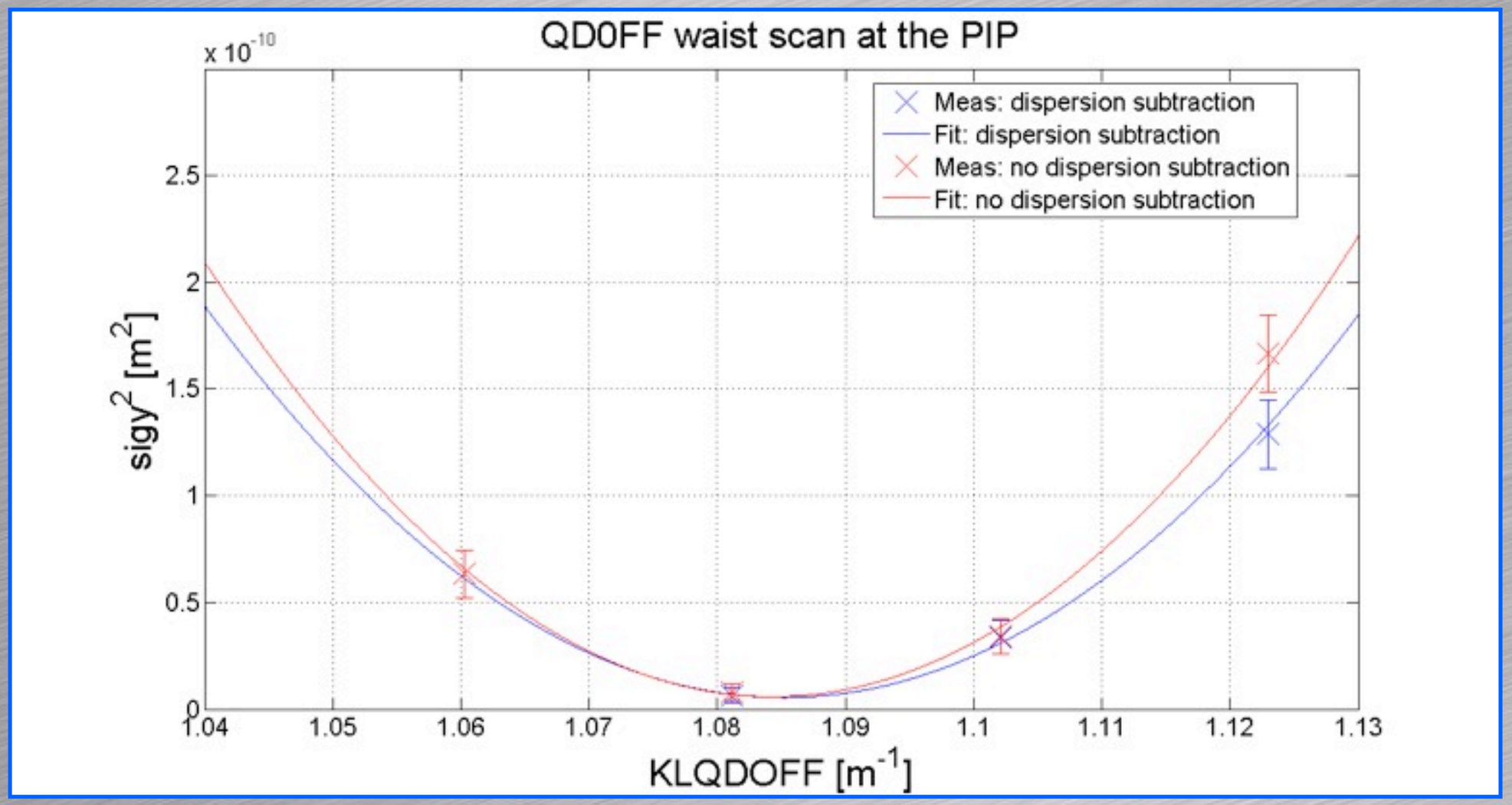




- 17 pm ε_y emittance
- BMAG=1.1
- Use model fitted dispersion values

Upstream seems to be well tuned in X and Y.

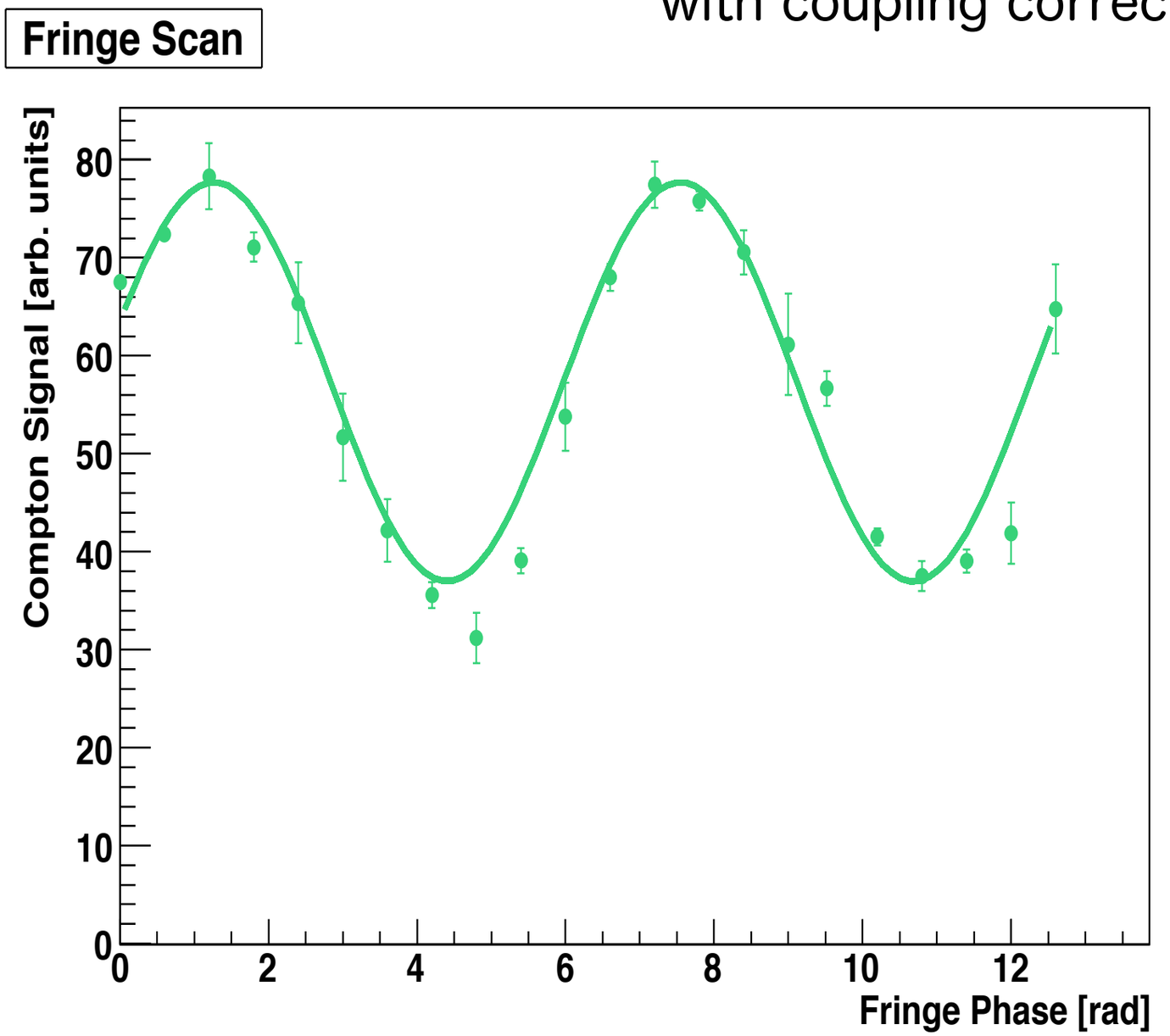
V PIP Waist Scans



- Waist min at 103.87A, sigma_y* = 2.33um
- Well matched (beta_y = 1.0 mm [method 1]) Good in Y!
  i.e. ε_y=17pm
- Min from IP scan = 3.0um @ 129 A (expect 130.32)

Fringe Scan Results (2 degree mode)

with coupling correction at PIP by QK1-4X (rough)



Crossing angle : 2.29 [deg]
Average of 4 bunches/point
Scan range 13.2[rad]
with a step of 600mrad

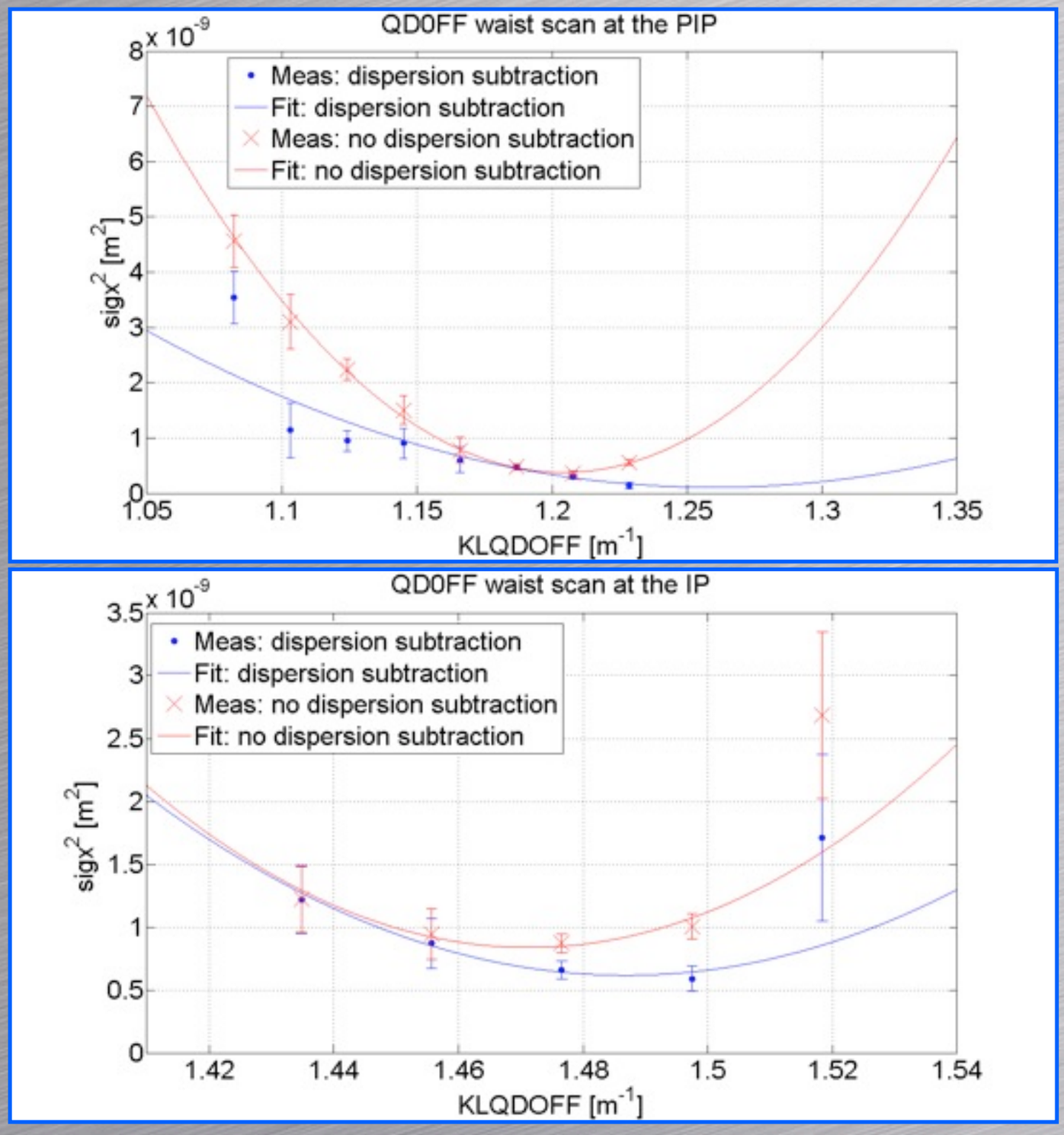
Fringe Pitch 13.3 um

Modulation = 0.35±0.01
σy = 3.1± 0.03 um
QD0 current at 129 A

as expected from the PIP beam size measurements !

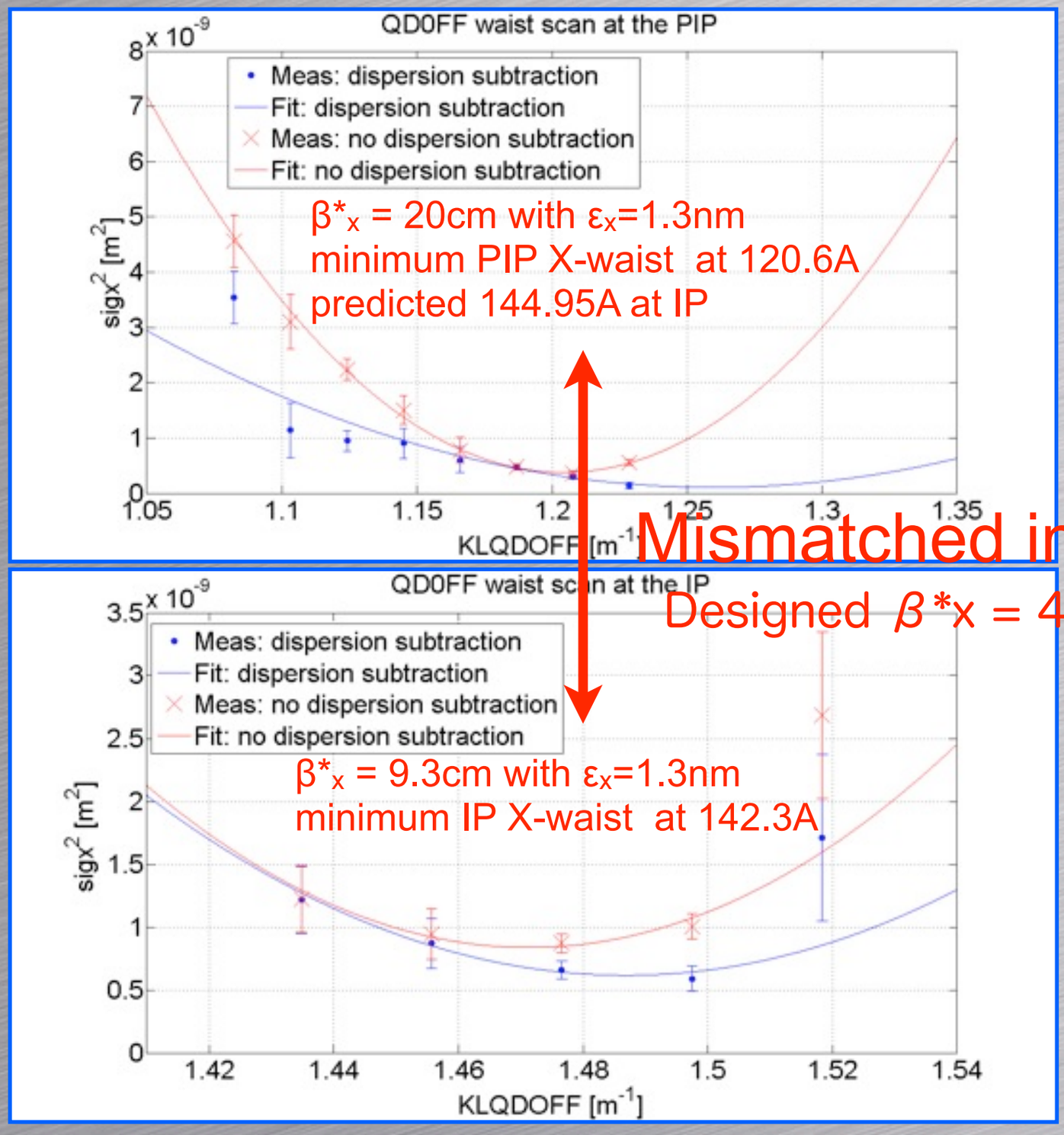
G. White, ATF Operation Meeting, 23 April, 2010

H PIP & IP Waist Scans



- Scan QD0FF field strengths
- Measure horizontal beam size
- IP with IPBSM x laserwire mode
- PIP using W wirescanner

H PIP & IP Waist Scans



- Scan QD0FF field strengths
- Measure horizontal beam size
- IP with IPBSM x laserwire mode
- PIP using W wirescanner

Summary

DR - vertical emittance to < 2pm as the ILC-DR

BPM electronics will be upgraded after IPAC10, June 2010.

Fast kicker studies - next study in June, 2010

(1) Good performance for single bunch beam, i.e. angular jitter of about 4 x 10^{-4}

(2) Need improvements for multi-bunch beam

for the FID pulser, BPM system, stable generation and storage in DR

R&Ds for the 2nd goal of ATF2 and ILC-BDS

(1) FONT5 : good progress, i.e. very impressive results

(2) IPBPM : tested at the upstream, wakefield effects seen,

KNU electronics will be updated at KNU.

(3) LW : installed and tested in the last run in April, 2010

(4) Multi-OTR system was installed in May, 2010.

ATF2 - 37nm by end of December, 2010

(1) All the instruments have been commissioned; i.e. BPMs, IPBSM etc.

(2) Beam tuning knobs have been developed and were also commissioned.

(3) The pre-continuos run successfully completed with IP X-mismatched issue;

to be ready for the continuous run towards 100nm beam size in May, 2010.

Final Remarks

1. Experimental verification of the ILC chromaticity correction i.e. ILC-BDS FF Design

   Development of beam tuning procedures

   Also, improvements can be suggested.

2. Development of instrumentation for ILC

   BPMs, movers, Fast feedback (FONT), Laserwire, beam size monitor, HA-PS, fast pulser, SC-FD etc.

3. Education of young generation for ILC

   Large participation of graduate students and post-docs as listed in a following table.

May, 2010

Dr Theses

Year	university	country	Name	title	publication
2007.11.12	Université de Savoie	France	Benoit Bolson	Etude des vibrations et de la stabilisation a l'echelle sous-nanometrique des doublets finaux d'un collisionneur lineaire	
2007.12.21	University of Tokyo	Japan	Taikan Suehara	Development of a Nanometer Beam Size Monitor for ILC/ATF2	Nuclear Instruments and Methods in Physics Research A 616 (2010) 1–8
2009.4.14	Royal Holloway, University of London	UK	Lawrence Deacon	A Micron-Scale Laser-Based Beam Profile Monitor for the International Linear Collider	PHYSICAL REVIEW SPECIAL TOPICS - ACCELERATORS AND BEAMS submitted (May 2010)
2010.6.8	UNIVERSITAT DE VALÈNCIA	Spain	María del Carmen Alabau Pons	Optics Studies and Performance Optimization for a Future Linear Collider: Final Focus System for the e-e- Option (ILC) and Damping Ring Extraction Line (ATF)	
2010.5.8	IHEP CAS	China	Sha Bai	ATF2 Optics System Optimization and Experiment Study	Paper with title "First beam waist measurements at the Accelerator Test Facility 2 at KEK" submitted to PRSTAB
2010.6.11	Université Paris-Sud 11	France	Yves Renier	Implementation and Validation of the Linear Collider Final Focus Prototype ATF2 at KEK (Japan)	
	Oxford university	UK		FONT studies	
2011.12.1	University of Tokyo	Japan	Masahiro Oroku	Beam Tuning with the Nanometer Beam Size Monitor at ATF2	
2011.12.1	Kyungpook National University	Korea	Youngim Kim	IPBPM and BBA	
2011.12.1	University of Manchester	UK	Anthony Scarfe	Tuning and alignment of ATF2 and ILC	
2012.2.xx	University of Tohoku	Japan	Taisuke Okamoto	cavity-type tilt monitor of beam orbit for ILC	
2012.12.1	Kyungpook National University	Korea	Siwon Jang	IPBPM and BBA	
2012.12.1	CERN	Spain	Eduardo Marin Lacoma	Ultra Low Beta Optics	
	Oxford university	UK		FONT studies	
	ICIF, Valencia university	Spain	Javier Alabau-Gonzalvo	emittance, coupling measuremwnts with multiple OTR system	