



# Summary/report of 7th ATF2 project meeting

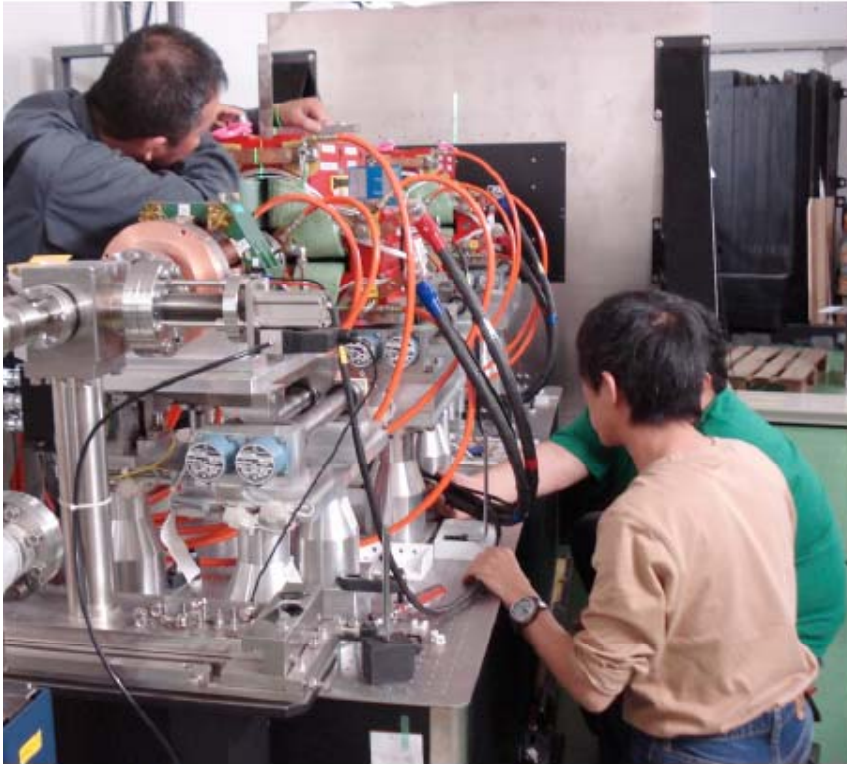
Andrei Seryi, Toshiaki Tauchi

December 15-18, 2008

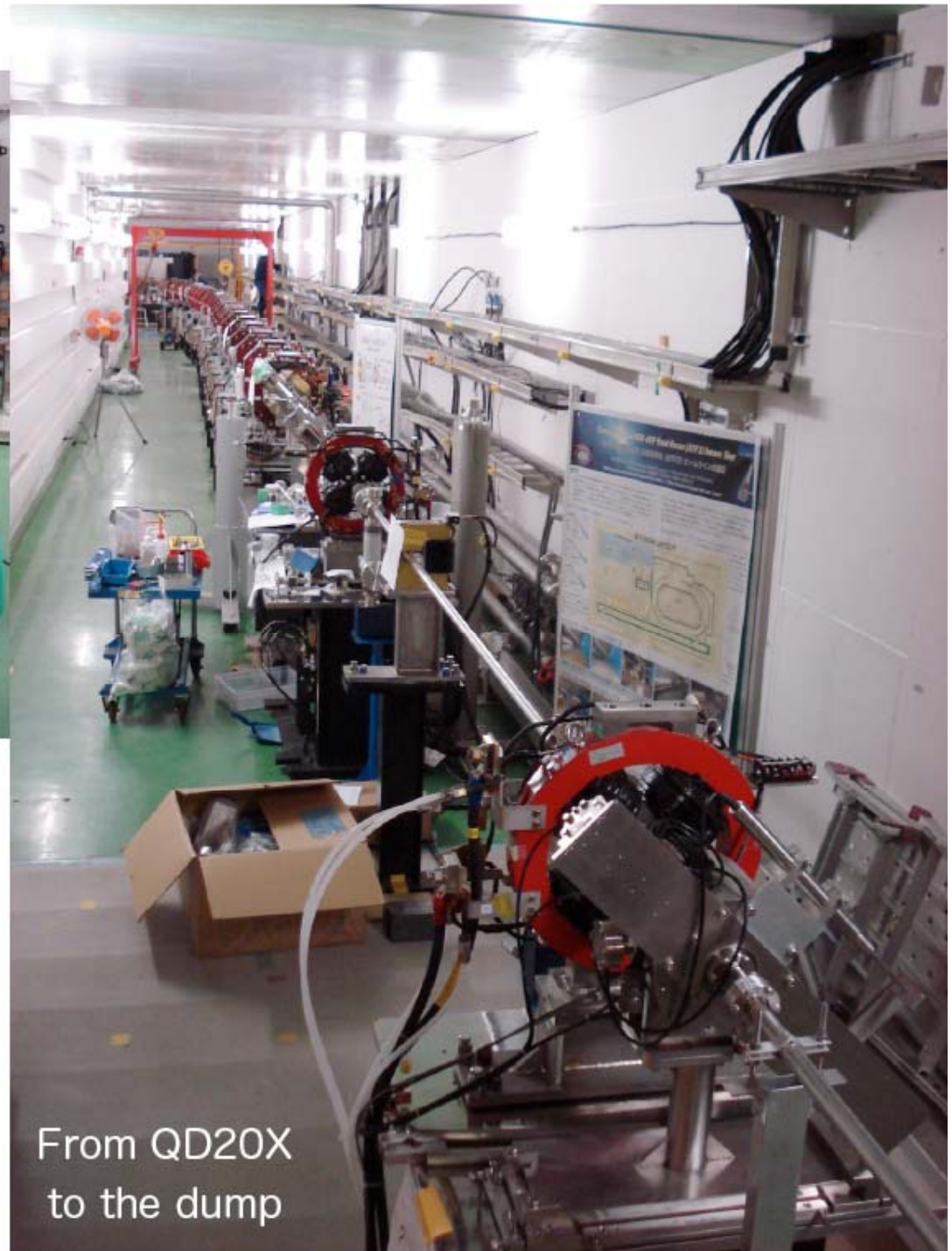
7th ATF2 Project Meeting

Joint session with 7th TB/SGC meeting

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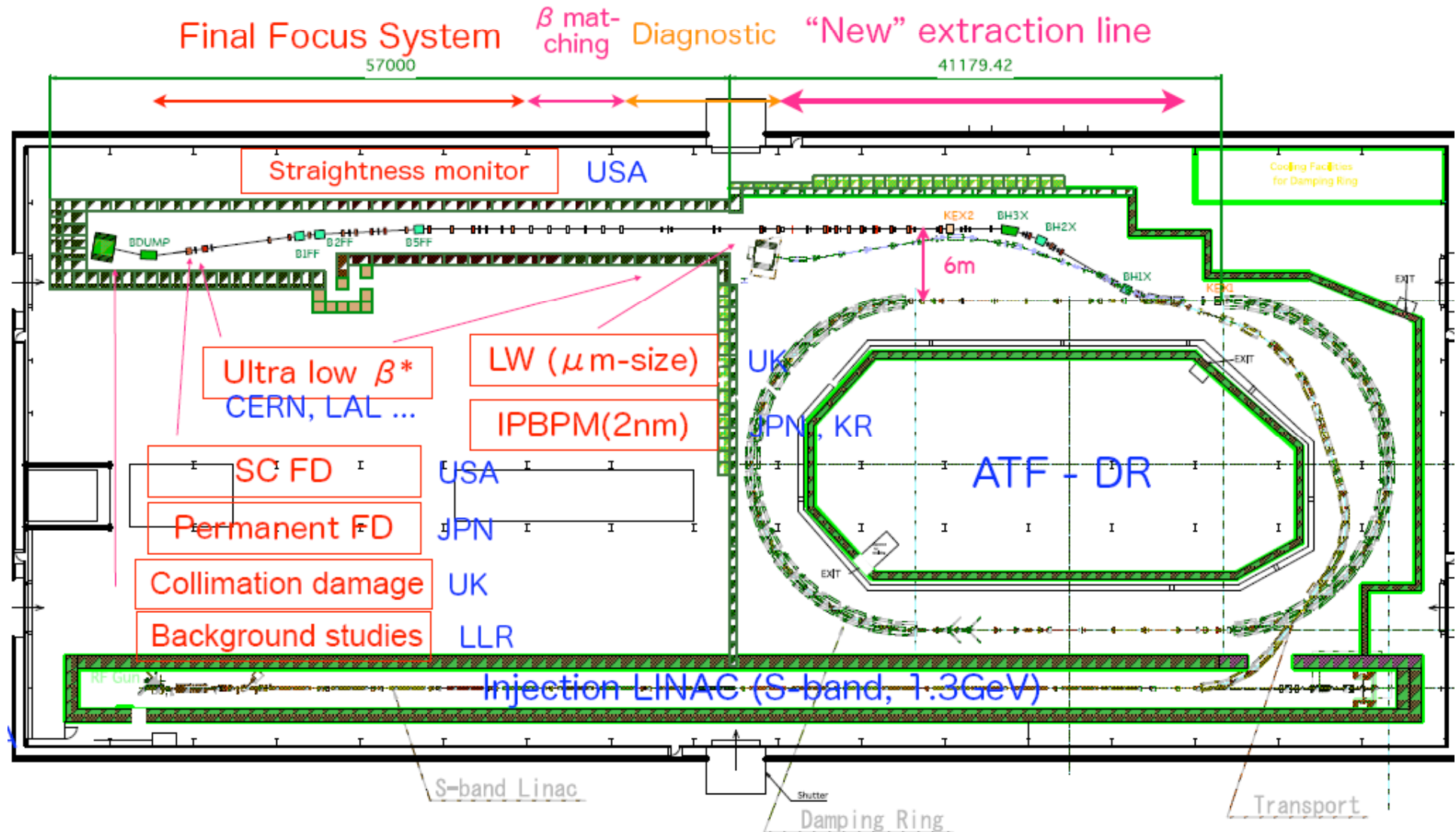
FD alignment after the  
Radiation Inspection ,  
11 December, 2008



From QD20X  
to the dump

# ATF2 beam line and planned/proposed R&Ds

2008 - 2010 - 2012 - 2014





## Optional Photon facility ; 2015 - 2019

- laser and optical cavities for photon linear collider
- generation of photon beam

## Future Laser Facility

### “Strong QED” experiments with Laser

- Non-linear QED with Laser intensity of  $> 10^{22}$  W/cm<sup>2</sup>

The “proposal” was presented by T.Tajima at the 6th TB/SGC meeting, 11-12 June 2008

Recommendation : need clear justification of uniqueness of the experiments at ATF2



April 2008

# Organization of Commissioning Team

Goal of the team is to achieve the target beam size, i.e.  $\sigma_y=37\text{nm}$ , by 2010. Also, the team will develop beam tuning tools and find the mostly needed ones for minimizing beam size.

Team leader : Toshiyuki Okugi (KEK)

Mailing list : [atf2-commissioning@ilcphys.kek.jp](mailto:atf2-commissioning@ilcphys.kek.jp) since April 2008

home page : <http://ilcphys.kek.jp/mail/atf2-commissioning/>

Monthly meetings with Webex

Coordination with other R&D tasks will be taken care by the System/Group Coordinators (SGCs) in the ATF international collaboration.

In the meantime, T.Okugi and K.Kubo will collaborate to plan a tentative schedule for three years with gathering information from the R&D tasks, since K.Kubo is Machine Study Schedule Coordinator in the SGCs.





# Organization of Software Projects

Expression of interests (Eols) for the projects has been called,  
24 June, 2008.

We adopt the two software environments, i.e.

- (1) in framework of V-system ( ATF control system) and
- (2) the flight simulation

Many softwares based on the V-system have been developed and used at ATF and the flight simulator is very useful to develop the softwares for colleagues especially outside of KEK.

Overall coordinator : Shigeru Kuroda (KEK)

Organizing task groups with priorities and task leaders

# ATF2 Software Tasks , Sep. 2008

Beam Tuning Direct	Beam Tuning Direct			Hardware Direct	Hardware Direct		
Project Title	Contributing Institutes	Priority	Leader	Project Title	Contributing Institutes	Priority	Leader
Coupling Mea.&Corr. in EXT	KEK,SLAC,LAL,CI	VH	C.Rimbault				
Dispersion Mea.&Corr. In EXT	KEK,SLAC,CI	VH	J.Jones				
EXT Beta-Matching	SLAC, KEK,CI,LAL	VH	K.Kubo				
EXT Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	Y.Renier	EXT Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	
FFS Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	A.Scarfe	FFS Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	
Beam Line Modeling Tools	SLAC,CI	M	S.Molloy				
IP FB( Pulse-Pulse)	LAL, JAI	H+L	Y.Renier	IP FB( Pulse-Pulse)	LAL, JAI	H+L	
FB Integration	SLAC, JAI	H	J.R.Lopez				
IP Waist&Beta adjustment	LAL(IHEP),CI	H	S.Bai				
Non-Mover-Based BBA(EXT)	KEK,LAPP	H	T.Okugi				
Mover-Based BBA(FFS)	SLAC,KEK,LAPP	H	J.Nelson				
				C&S-Band Cav.BPM IOC Dev.	JAI,UCL	VH	S.Booget
				IP Cav.BPM	KEK	M	Y.Honda
Final IP Spot-Size Tuning	SLAC,KEK,LAL,Tokyo,CERN,CI	M/H	G.White				
				Magnet Mover IOC Dev.	SLAC	M/H	J.Nelson
				EPICS Interface for WS/etc	JAI(LW?)	M/H	
				Software Interface for IP BSM	Tokyo	M/H	Y.Kamiya
Bunch-Bunch IP FB(Intra-Pulse)	JAI	M	J.R.Lopez	Bunch-Bunch IP FB(Intra-Pulse)	JAI	M	P.Burrows
FS Core Software Dev.	SLAC	M(Ongoir)	G.White				
				Controls Infrastructure Dev.	JAI,SLAC,KEK	M(Ongoir)	N.Terunuma
EXT Bunch-Bunch FB	JAI,Oxford	L/M	J.R.Lopez	EXT Bunch-Bunch FB	JAI,Oxford	L/M	P.Burrows
				EPICS Readout of Fiber-PLIC		L	
				PS IOC Dev.	SLAC	L	
Integrated Automated Tuning	SLAC	L	G.White				



# Beam Commissioning Team Tasks

Task Group Leaders  
( Priority )

VH = very high

H = high

M = medium

L = low

X = not specified

## Beam deliver to the dump with small beam loss

- Beam delivery to the dump KEK, ... S.Kuroda(X)
- New RF gun commissioning KEK, ... S.Kuroda(X)
- Good injection efficiency  
( LINAC stabilization etc. ) KEK, ... S.Kuroda(X)
- PLIC cable for beam loss monitor SLAC, ... D.McCormick(X)

## Hardware Commissioning for ATF2 ( including the software work )

- Magnet HA-PS SLAC, KEK, ... B.Lam(X)
- Magnet movers  
( beam steering test with mover ) SLAC, LAPP, KEK, J.Nelson(M/H)
- Cavity BPMs (S and C-band)  
( calibration of position sensitivity with beam ) JAI, UCL, SLAC, KNU, KEK, ...  
S.Boogert(VH)

## Alignment and Stability

- alignment of magnets KEK R.Sugahara(X)
- FD system and vibration/GM LAPP, Tokyo univ. B.Bolzon(X)

## Optics Modeling

- Measurement of the quadrupole strength error and optics modeling of the extraction and ATF2 beamline KEK, SLAC, (Daresbery ), ... S.Molloy(M)
- BBA ( with/without Mover ) KEK, SLAC, ... T.Okugi(H)  
J.Nelson(H)

## Beam diagnostics at extraction line

- Dispersion correction KEK (Vsystem based), J.Jones(VH)  
SLAC (FS based ), ...
- Coupling correction KEK, SLAC, LAL, ...  
C.Rimbault(VH)
- Beta Matching KEK, SLAC, ... K.Kubo(VH)
- Emittance growth study from DR to EXT LAL, (Daresbery), SLAC, KEK,  
... P.Bambade (X)

## IP BSM studies

- Laser Interferometer ( Shintake Monitor ) U. of Tokyo, KEK, Y.Kamiya(M/H)
- IP BPM KEK, KNU, ... Y.Honda(M)
- Carbon Wire Scanner SLAC, KEK, ... D.McCormick(M)

## Feedback Study

- EXT Orbit correction and feedback SLAC,KEK,LAL,CI,JAI Y.Renier(VH)
- Orbit Feedback ( pulse-to-pulse ) at IP KEK, SLAC, LAL, Y.Renier(H/L)
- Intra-train feedback at EXT and IP Oxford, JAI, ... J.R.Lopez(M)
- FFS Orbit correction and feedback SLAC,KEK,LAL,CI,JAI A.Scarfe(VH)

## Beam size tuning at ATF2 final focus line

- FF Optics studies LAL, IHEP, ...
  - with large beta optics S.Bai(H)
  - by IP waist scan R.Tomas(X)
  - pushed beta optics CERN,SLAC,KEK,LAL,CI,JAI
- Final IP spot size tuning ALL G.White(M/H)



# Goals at this meeting

## 1. Agreement of “monthly” milestones by 2010

- suggestion base on beam size

## 2. Detailed plan for sub-systems

- DR emittance, IPBSM, IPBPM (2nm) , Monalisa and FONT etc.
- ILC like bunches by the fast kicker
- control and tuning software, i.e. serialization of the tasks

## 3. Detailed schedule by end of March, 2009

- Installation/removable of fast kicker study
- Installation of new QM7R('s)
- re-alignment of beam lines ( BT and FF )
- IPBSM commissioning with 8 and 2 degree modes
- DR emittance to be  $\varepsilon_y=24\text{pm}$  by end of February, 2009

## 4. Agreement of publication policy

# Session Organization

	15th Dec. Monday	16th Dec. Tuesday	17th Dec. Wednesday	18th Dec. Thursday
9:00		Beam dia. at EXT	Beam size tuning	Joint w. TB/SGC
		Optics modeling	Comm, Plan (milestones) and Organization	Summary of project meeting
12:00		Feedback system		R&D status
13:30	Introduction -start at 14:00	Beam dia. at EXT -start at 13:00	Publication policy	TB/SGC
	Comm. status	Align. & stability	Joint w. ILC-BDS	Proposals (4)
	Specil seminar at 17:00 -	IPBSM		closed session
16:00				Conclusion

16:30, ATF Daily operation meeting

18:00- Banquet



# Session Organization

- Introduction
  - Greeting Junji Urakawa (KEK)
  - Goals at this meeting Toshiaki Tauchi (KEK)
  
- Commissioning Status
  - Beam Operation for Radiation Inspection & First Commissioning Shigeru KURODA (KEK)
  - HA power supply system Briant Lam (SLAC)
  - Mover system Janice Nelson (SLAC), Glen White (SLAC)
  - Cavity BPM system Stewart Boogert (Royal Holloway, University of London)
  - Installation of FD in September Andrea Jeremie (LAPP)
  - PLIC monitor and IP wire scanner Doug McCormick (SLAC)

9:0				
12:0				
13:30	Introduction -start at 14:00	Beam dia. at EXT -start at 13:00	Publication policy	TB/SGC
	Comm. status	Align. & stability	Joint w. ILC-BDS	Proposals (4)
	Specil seminar	IPBSM		closed session
16:00	at 17:00 -			Conclusion

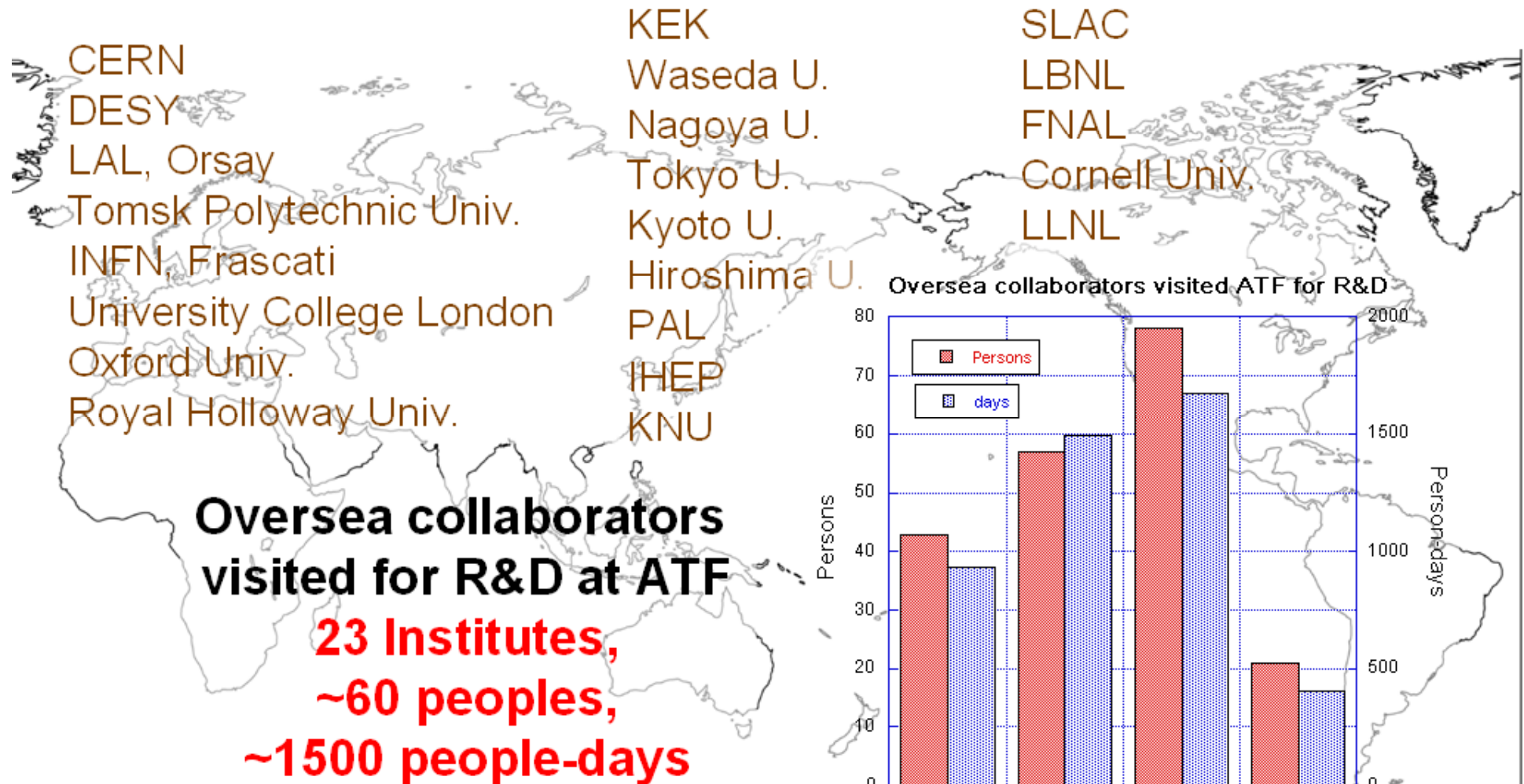
16:30, ATF Daily operation meeting      18:00- Banquet



# Greeting for 7<sup>th</sup> ATF2 project meeting



## ATF International Collaboration



# What's New

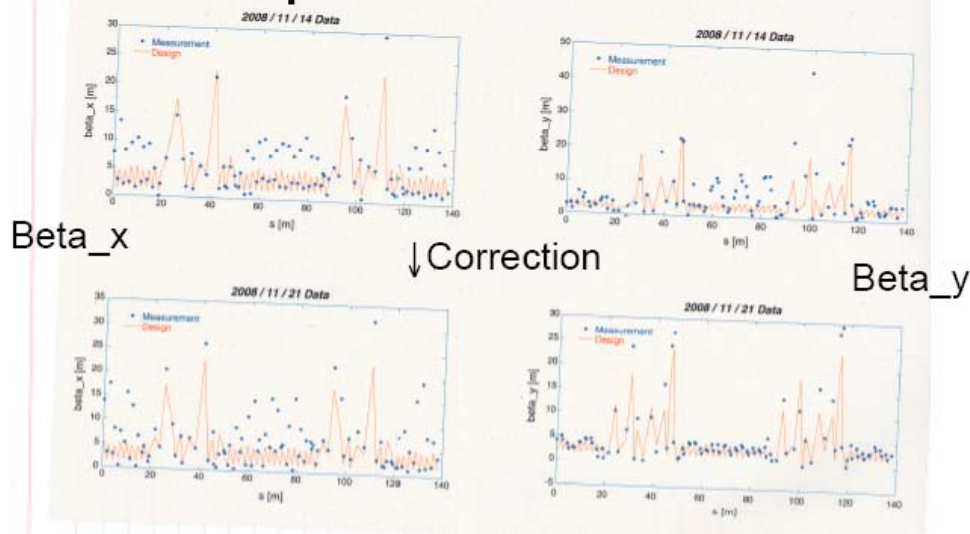
- New RF gun
- DR re-alignment in summer 2008
- New ATF2 beam line
- ...

## New RF gun

Designed for high power & less dark current  
Looks working fine as ATF injector

Detail will be reported in thesis by

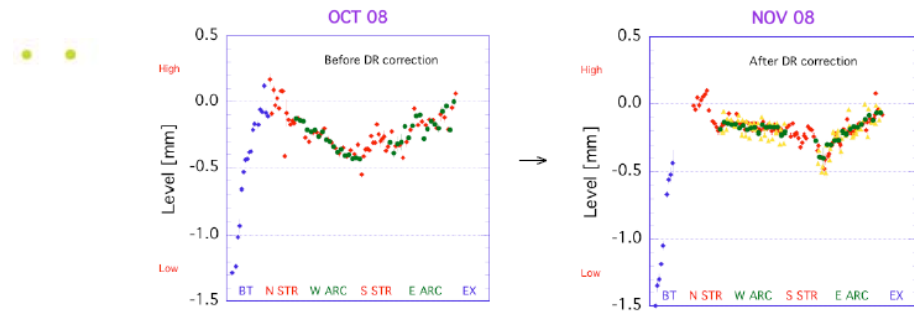
## DR Optics Correction



Beta\_y is well corrected. For beta\_x, there was some difficulty of measurement (unknown horizontal vibration was observed at that time).

# DR Commissioning

DR re-alignment in summer 2008



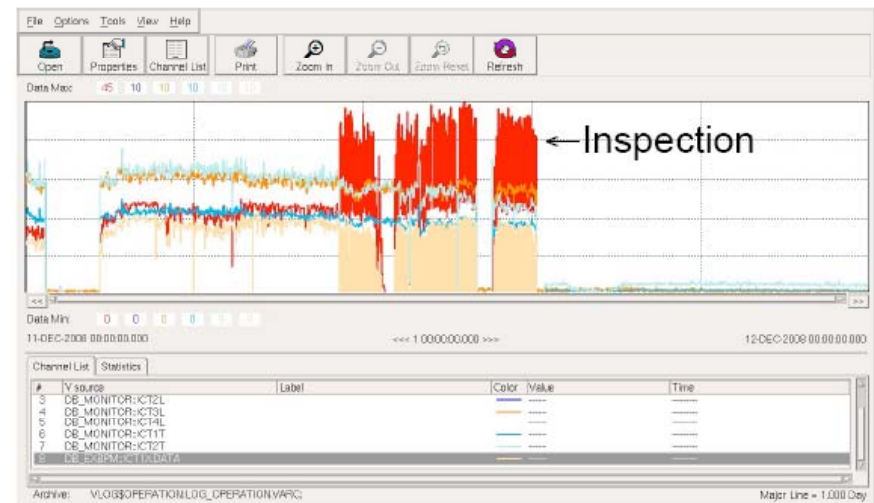
Alignment done for

V position: All around the ring

H position: Straight section

## Inspection

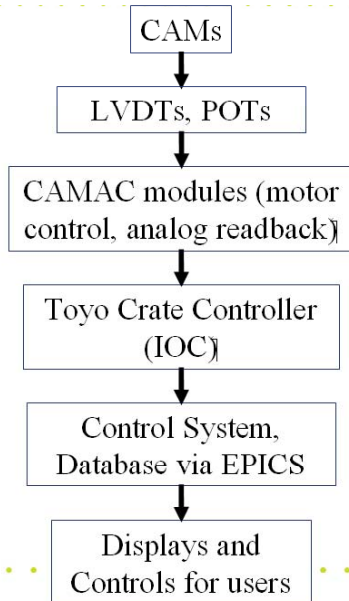
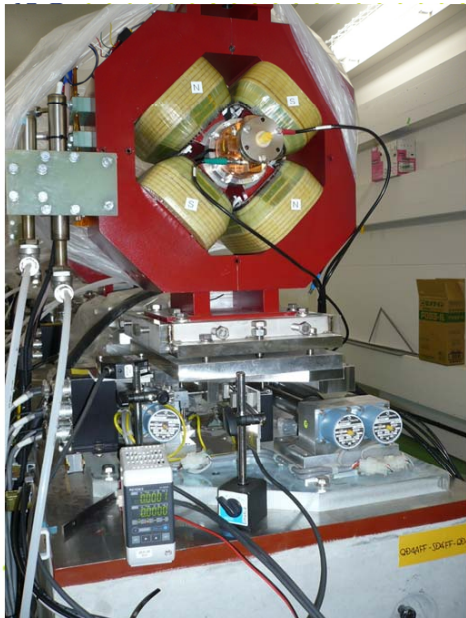
- Inspection was done 11th Dec. 2008.
- Radiation, Inter-lock system,...



Done without big problem!

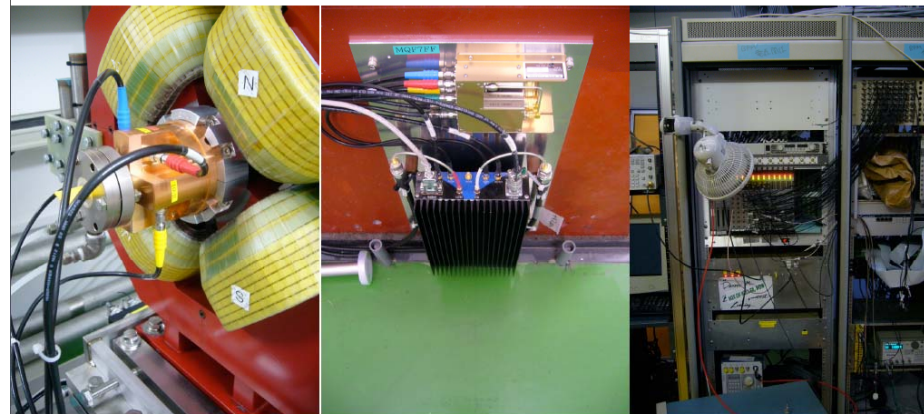


- Control & readbk through EPICS via Toyo CAMAC crate controller to mover table on 3 cams with motors and readbk.



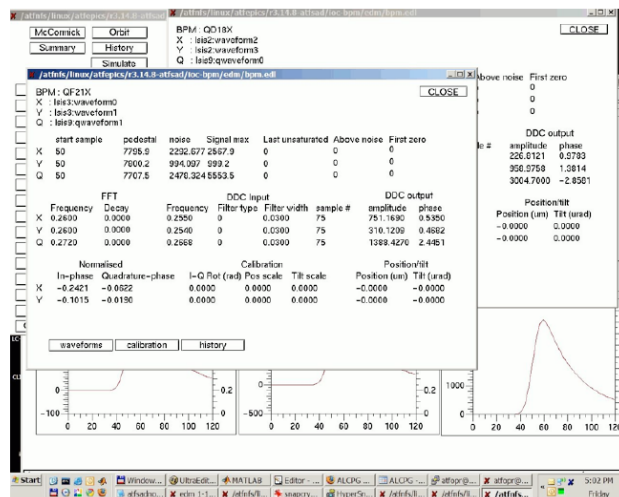
## C-band system

- Fully installed and operational
- Tone calibration system, temperature monitoring

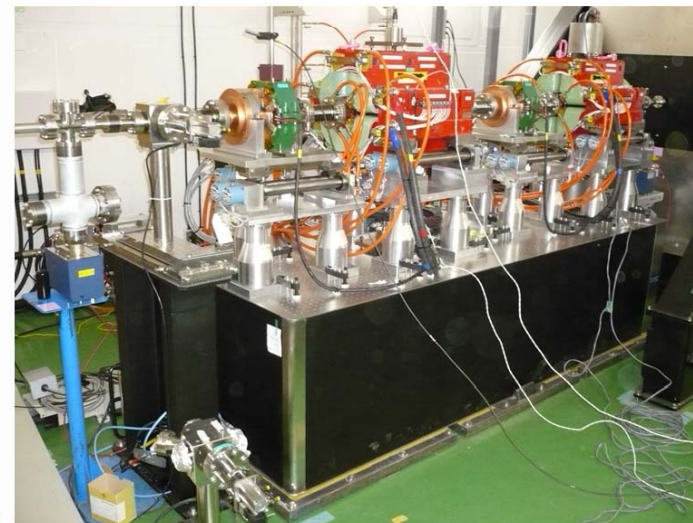


## Online DDC algorithm

- Processing codes operating in ATF
- Used by first real BPM shift
- Consistent environment for all
- Simple displays



## FD mid-november 2008





# Session Organization

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12:00		Optics modeling Feedback system	Comm, Plan (milestones) and Organization	R&D status

- **Beam Diagnostics at Extraction Line**

- Dispersion correction James Jones (Daresbury)
- Coupling correction Cecile Rimbault (LAL)

- **Optics Modeling**

- Beamline Modeling Tools Stephen Molloy (SLAC)
- BBA without mover Toshiyuki Okugi (KEK)

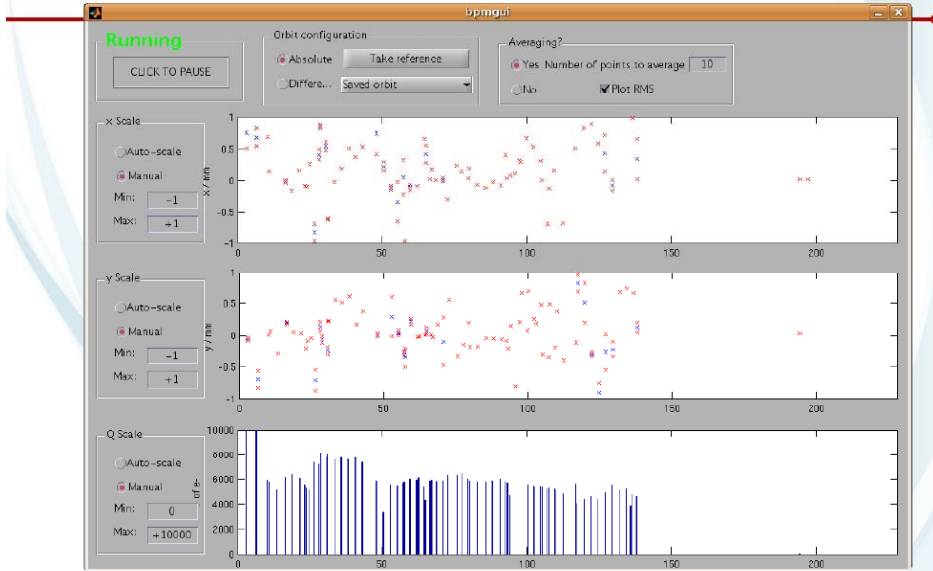
- **Feedback System**

- orbit reconstruction & correction in the ATF2 EXT Yves Renier (LAL)
- Design & Simulation of Intra-train Feedback Systems at ATF2: Javier Resta Lopez (JAI)
- FFS Orbit correction and feedback Anthony Scarfe (University of Manchester)

# ATF2 Software Tasks , Sep. 2008

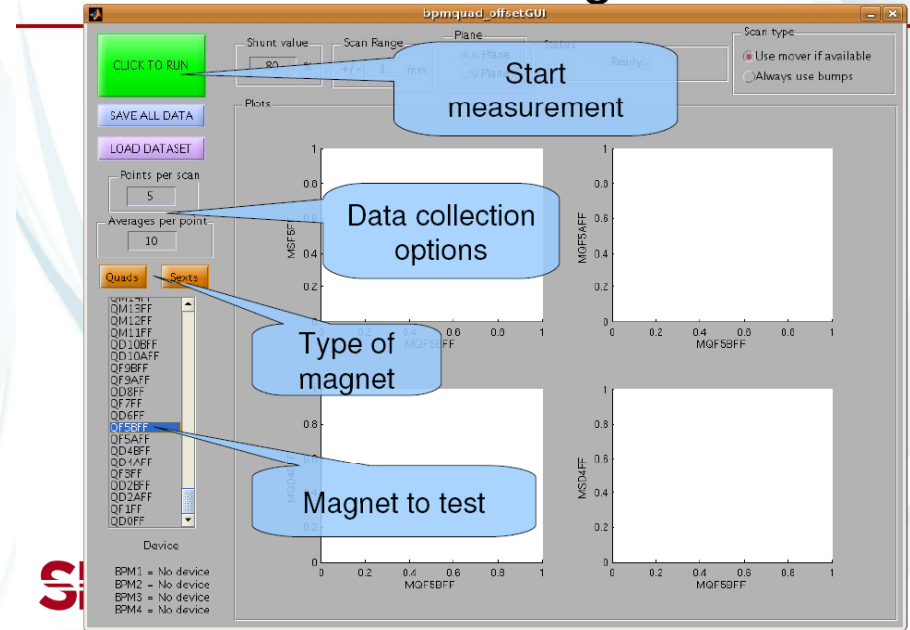
Beam Tuning Direct	Beam Tuning Direct			Hardware Direct	Hardware Direct		
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EXT Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	Y.Renier	EXT Orbit Corr./FB	SLAC,KEK,LAL,CI, JAI	VH	
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Beam Line Modeling Tools	SLAC,CI	M	S.Molloy				
IP FB( Pulse-Pulse)	LAL, JAI	H+L	Y.Renier	IP FB( Pulse-Pulse)	LAL, JAI	H+L	
FB Integration	SLAC, JAI	H	J.R.Lopez				
IP Waist&Beta adjustment	LAL(IHEP),CI	H	S.Bai				
Non-Mover-Based BBA(EXT)	KEK,LAPP	H	T.Okugi				
Mover-Based BBA(FFS)	SLAC,KEK,LAPP	H	J.Nelson				
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Final IP Spot-Size Tuning	SLAC,KEK,LAL,Tokyo,CERN,CI	M/H	G.White				
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				Controls Infrastructure Dev.	JAI,SLAC,KEK	M(Ongoir)	N.Terunuma
EXT Bunch-Bunch FB	JAI,Oxford	L/M	J.R.Lopez	EXT Bunch-Bunch FB	JAI,Oxford	L/M	P.Burrows
				EPICS Readout of Fiber-PLIC		L	
				PS IOC Dev.	SLAC	L	
Integrated Automated Tuning	SLAC	L	G.White				

# BPM Display – real beam!

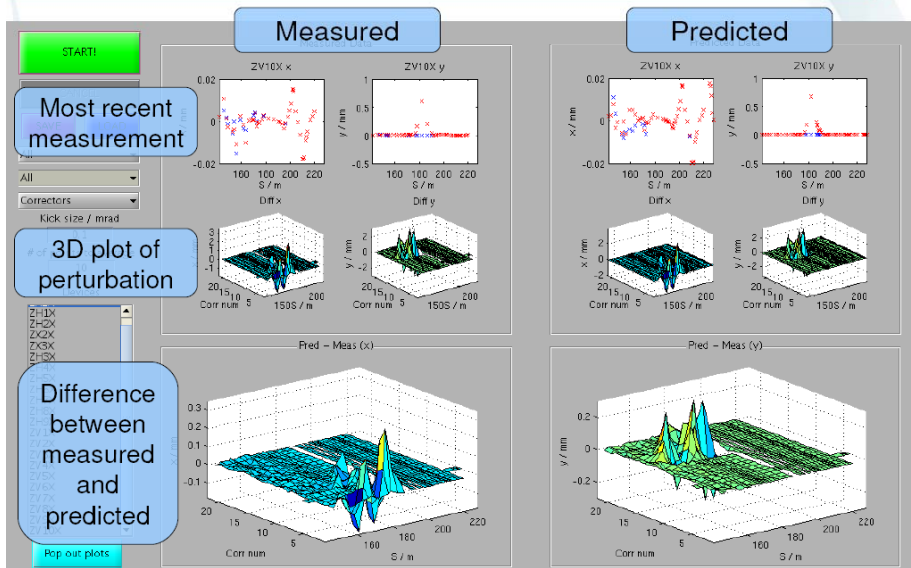


**SLAC** Multibunch beam & uncalibrated BPMs

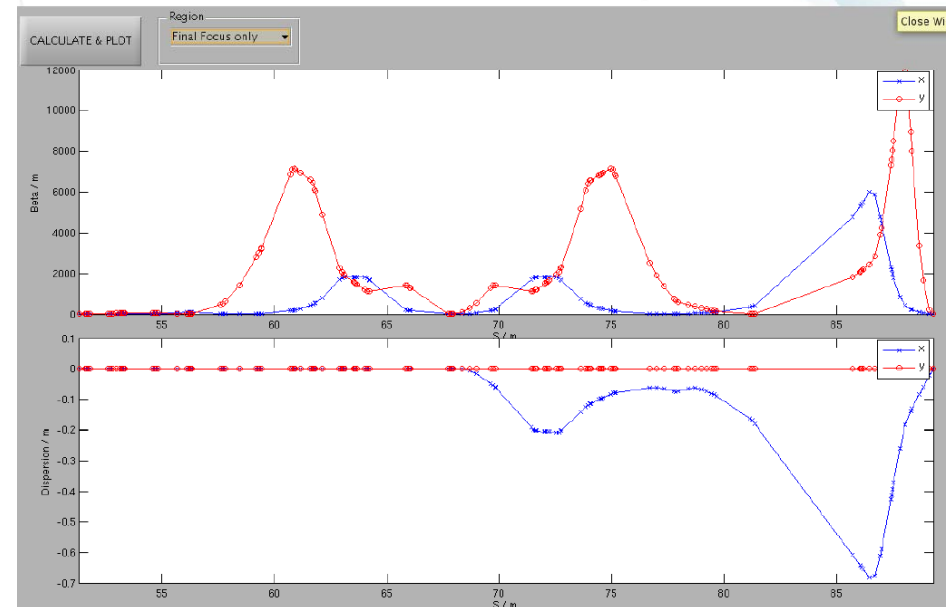
# Beam-Based Alignment



# Lattice Verification – Measurement



# Twiss Calculation (very basic)





- **Beam Diagnostics at Extraction Line**
  - Beta matching Kiyoshi Kubo (KEK)
  - non-linear field in the ATF EXT & emittance growth Angeles Faus-Golfe (IFC)
  - Magnetic field measurement of new "QM7R" (TOKIN 3581) Mika Masuzawa (KEK)
  - Case for replacing QM7R with TOKIN 3581 Philip Bambade (LAL)
- **Alignment and Stability**
  - Re-alignment of DR Mikio Takano (Saube company)
  - Alignment of magnets at the extraction line (ATF2) Ryuhei Sugahara (KEK)
  - Vibration measurements on the FD and Shintake monitor Benoit BOLZON (LAPP)
  - Monalisa Warden Matthew (Oxford university)
- **IP BSM ( Shintake monitor system )**
  - IP Beam Size Monitor Yoshio Kamiya (ICEPP, The University of Tokyo)
  - IP BPM and beam tilt monitor Yosuke Honda (KEK)

12:00				
13:30	Introduction -start at 14:00  Comm. status	Beam dia. at EXT -start at 13:00  Align. & stability	Publication policy  Joint w. ILC-BDS	TB/SGC Proposals (4)  closed session
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16:30, ATF Daily operation meeting

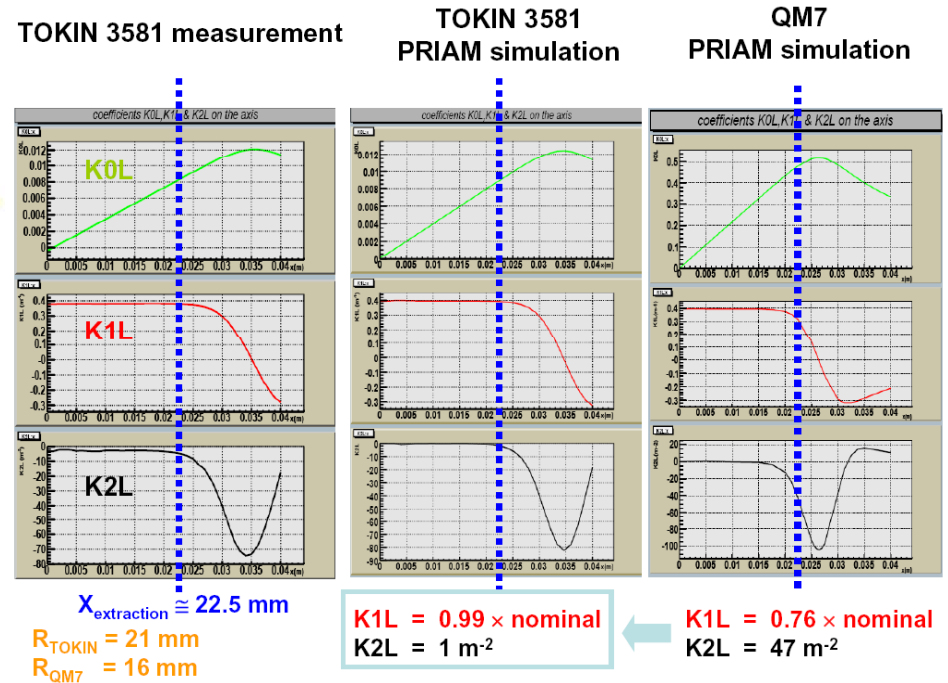
18:00- Banquet

# Proposed replacement of QM7 by TOKIN 3581

Philip Bambade (LAL, KEK)  
 Guy Le Meur & François Touze (LAL)  
 Mika Masuzawa (KEK)

Building on the work by:  
 M. Alabau, A. Faus-Golfe (IFIC) and many others at  
 SLAC, LAL, KEK and in the UK

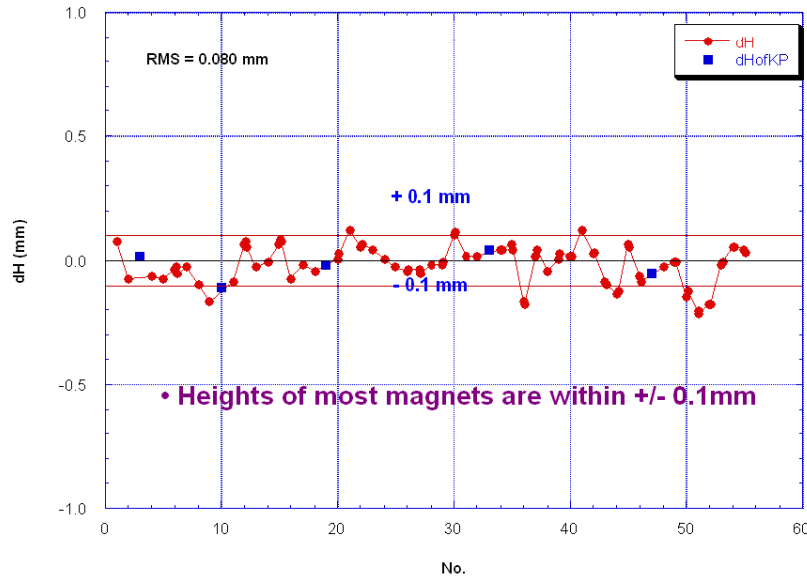
7th ATF2 Project Meeting KEK December 15-18, 2008



7th ATF2 Project Meeting  
 15 - 18 December 2008

## Height Survey after the Second Alignment

aftrAlign\_level



P10

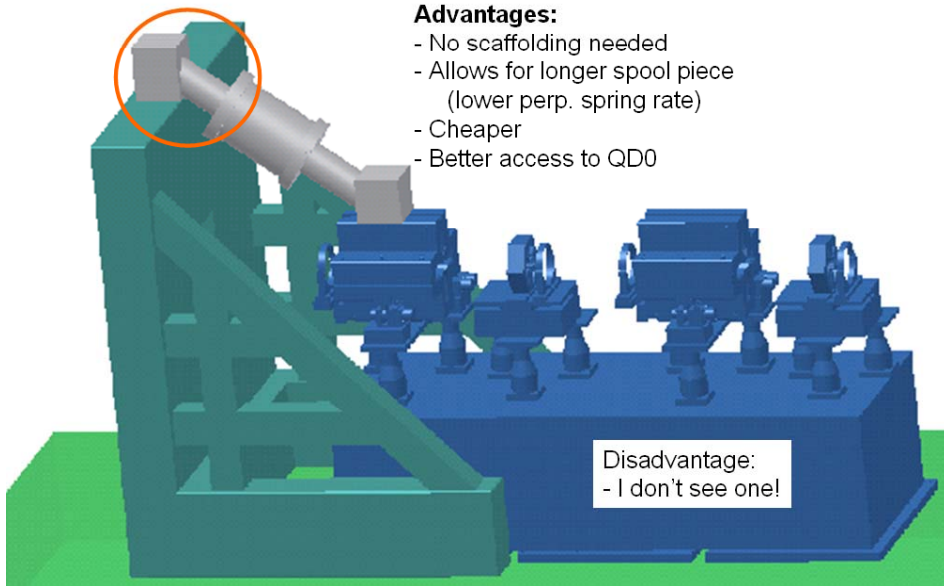
- ✓ Flowing water: no impact on [QD0; QF1] relative motion to the floor
- ✓ With ground motion, relative motion of Shintake to [QD0; QF1]:

	Tolerance	Measurement (between QD0)	Measurement (between QF1)
Vertical	7 nm (for QD0) 20 nm (for QF1)	4.8 nm	6.3 nm
Perpendicular to the beam	~ 500 nm	30.7 nm	30.6 nm
Parallel to the beam	~ 10,000 nm	36.5 nm	27.1 nm

- ✓ In horizontal directions, vibrations are well below tolerances
- ✓ In vertical direction, tolerances are stricter but vibrations are still within tolerances
- ✓ Future prospects: check that vibrations are still within tolerances with higher ground motion



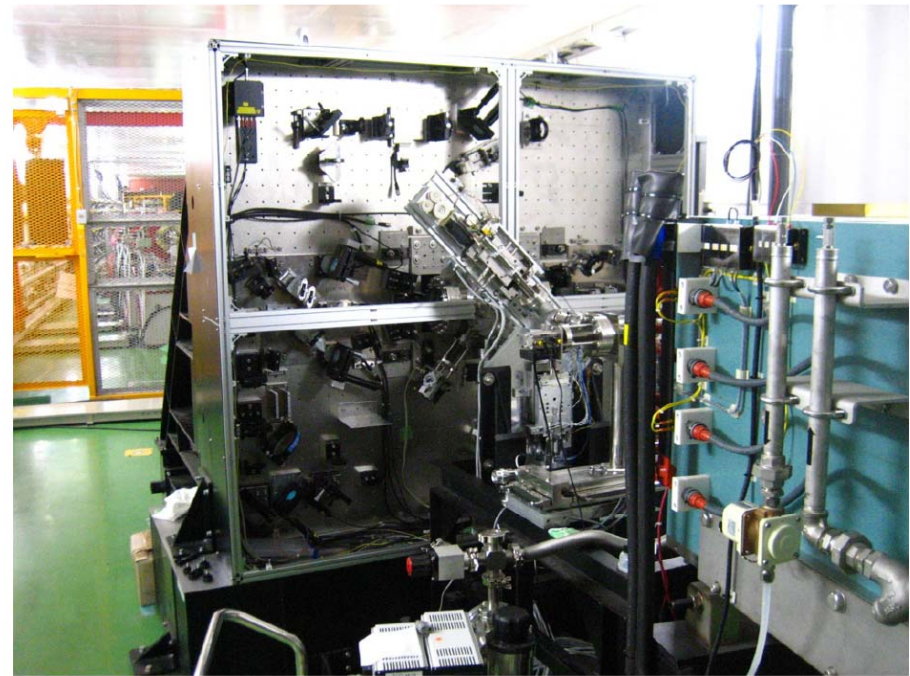
# One active double bellow system



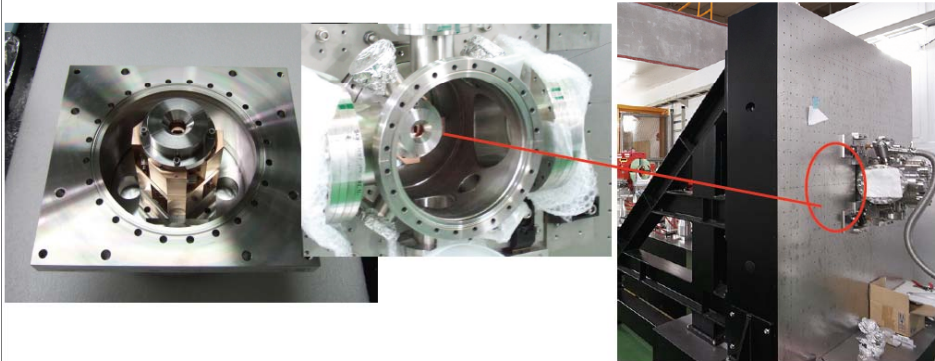
**Advantages:**

- No scaffolding needed
- Allows for longer spool piece (lower perp. spring rate)
- Cheaper
- Better access to QD0

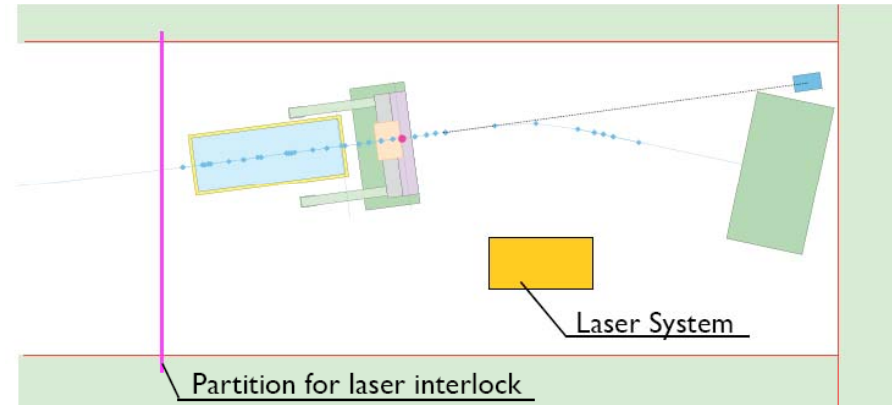
Disadvantage:  
- I don't see one!



## IPBPM in BSM system



- High resolution beam position monitoring is important for the IP-beam size monitor. A new one (a little compact model, not vacuum tight) is made.
- We can use the old IPBPM electronics (developed for phase 2).
- Data acquisition will be included in the BSM system.
- The IPBPM is removed from the vacuum chamber at present concerning its small aperture.
- Maybe re-installation will be after establishing the commissioning of BSM.



Shintake Monitor was installed at the IP.  
The error sources was evaluated.  
3 nm resolution is expected for 37 nm beam.

We are going to try the Laser Wire mode in this week.  
The other Shintake mode will be tested in stages next year.



# Session Organization

	15th Dec. Monday	16th Dec. Tuesday	17th Dec. Wednesday	18th Dec. Thursday
9:00		Beam dia. at EXT	Beam size tuning	Joint w. TB/SGC
		Optics modeling	Comm, Plan (milestones) and Organization	Summary of project meeting
12:00		Feedback system		R&D status

13:30

- **Beam Size Tuning**
  - FF Optics studies with large beta optics and IP waist scan Sha BAI (IHEP)
  - IP beam size tuning with IP BSM Glen White (SLAC)
- **Commissioning Plan and Organization**
  - Basic assumptions and goal of organizing the commissioning with milestones and schedule Toshiyuki Okugi (KEK) , Philip Bambade (LAL)
  - Suggested milestones for 2008 through 2010 Andrei Seryi (SLAC)
  - Plans and contributions by all collaborating institutes
  - Discussion on the commissioning organization and milestones

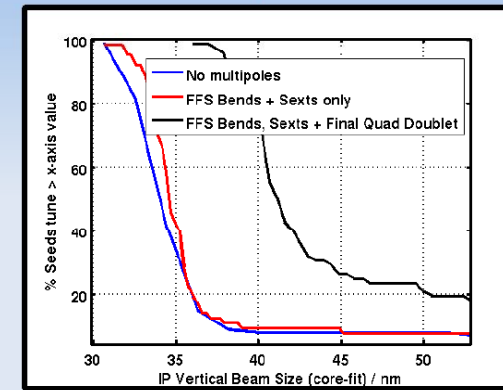
16:00

## Multipole Measurements

Magnet Name	Sextupole/quad	Octupole/quad	10pole/quad	12pole/quad	20pole/quad
Tolerance (tightest)*	<0.03	<0.025	<~0.01	<0.05	<0.12
QD0 at 132.2 amps	0.0255	0.0052	0.007	0.036	0.0027
QF1 at 77.5 amps	0.0274	0.0058	0.0128	0.036	0.0027

- Measured multipoles exist for final focus bends, sextupoles and final doublet quads.
- All have minimal effect on beam size and tuning process other than those highlighted above.

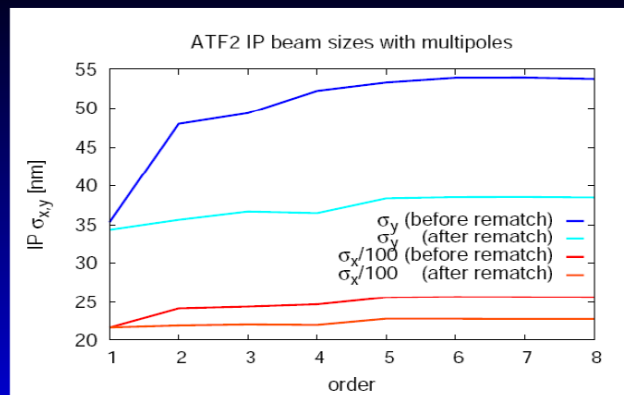
## Simulation Results with Multipoles



- Measured multipoles of final doublet have major impact on beam size (mainly due to sextupole component).
- Need to rematch optics for these conditions before tuning.

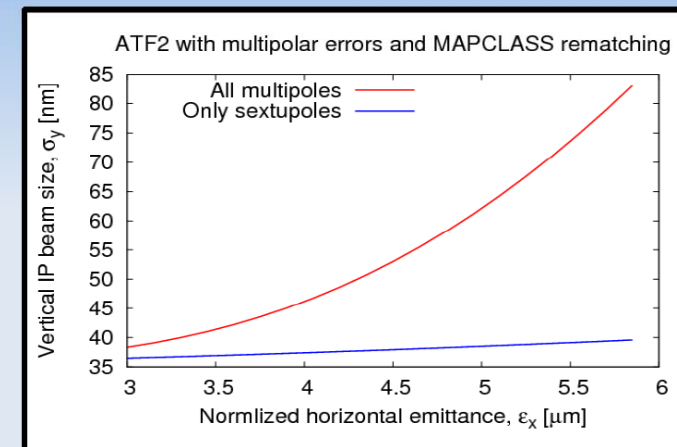
## MADX Tracking with Rematched Optics

### IP $\sigma$ before and after rematching



Dodecapolar component remains in both planes.  
Do we need a dodecapole? octupole?

## Effect of Horizontal Emittance



- 12-pole in QF1FF causes vertical beamsizes growth at IP with higher horizontal emittances.

# ATF2 commissioning: articulated, collaborative, efficient

## Basic goals:

- achieve LC technical demonstration(s) implies
  - time-line for relevance
  - realistic milestones for vision + advance planning
- small-scale model for broad collaboration in accelerator field, suitable for LC
  - large accelerator labs + university research groups
  - diverse + complementary skills
  - international

## Assumptions

- non-ATF2 commissioning R&D continues in parallel → 50% < beam time >
- support by all collaborating groups (hardware / software & commissioning work)

## Organisation as project

- Milestones serve as guide for advance planning of many parallel activities
  - more detailed sub-project schedule + needs / inter-dependencies
  - check (and solve !) schedule conflicts / resource problems
- Coordinate detailed monthly task plan with weekly scheduling
- Regular review through discussion in monthly commissioning meeting
- Program-based advanced scheduling of weekly shift participation

**→ MECHANISM**





# What are natural milestones for ATF2?

- ATF2 design:
  - Nominal IP  $\beta_y^* = 0.1$  mm &  $L^* = 1$  m  $\rightarrow$  this give ~same chromaticity as ILC with  $\beta_y^* = 0.4$  mm and  $L^* = 4$  m
  - Nominal  $\gamma\epsilon_y = 3e-8$  m (or  $\epsilon_y = 12$  pm) gives  $\sigma_y^* \sim 37$  nm
- However, the ILC design  $\sigma_y = 5.7$  nm at 250 GeV, and if this is rescaled to 1.28 GeV, it gives  $\sigma_y \sim 80$  nm
  - (ILC gets 5.7 nm with  $\gamma\epsilon_y = 4e-8$  m, and if it is  $\gamma\epsilon_y = 3e-8$  at in ATF2 nominal, then the size scaled to 1.28 GeV is 70 nm)
- Two milestones suggested for ATF2 commissioning:
  - 1) “ILC scaled beam size”:  $\sim 75$  nm at ATF2
    - (Happen to be about what was achieved at FFTB)
  - 2) “ILC-chromaticity” or “ATF2 design”:  $\sim 37$  nm at ATF2

# ATF2 milestones

	2009										2010									
	dec	jan	feb	mar	apr	may		oct	nov	dec	jan	feb	mar	apr	may		oct	nov	dec	
BSM Laser Wire mode commissioned	■																			
First test of fast kicker		■																		
Observe several micron beam size			■																	
Achieve $\epsilon_y=24\mu\text{m}$ beam in DR			■																	
BSM $8^\circ$ (0.25-1.5 $\mu\text{m}$ ) commissioned				■																
Observe sub micron beam size				■																
BSM $2^\circ$ mode (1-6 $\mu\text{m}$ ) commissioned				■																
Achieve $\epsilon_y=24\mu\text{m}$ beam in DR				■																
Extract and preserve of $\epsilon_y=24\mu\text{m}$					■															
BSM $30^\circ$ (70-400nm) commissioned					■															
First observation of ILC-scaled $\sigma_y=75\text{nm}$						■														
Achievement of $\epsilon_y < 12\mu\text{m}$ in DR						■														
Repeat observation of 75nm beam							■													
Extract & preserve $\epsilon_y=12\mu\text{m}$ beam								■												
BSM $174^\circ$ (20-100nm) commissioned									■											
First observation of design 37nm beam										■										
Fast kicker system fully commissioned											■									
Monalisa installed on beamline											■									
Reliable observation of 37nm beam											■	■	■							
First tests of mild beta squeeze												■								
Achieve 2nm resolution of IP BPM													■							
Evaluate IR position stability to nm level													■							
Commissioning of Monalisa													■							
Commissioning of FONT feedback																	■			
Observe of nm stability of IP position																		■		
Initial tests of squeezed $\beta$ -function																			■	

VERY TENTATIVE



## More comments...

- Plan for 21 weeks of operation per year
  - About 50% for ATF2
  - Another 50% for other ATF R&D program, DR, linac upgrade and maintenance
- Presently, it is difficult to operate during weekends, because there are not enough sub-shift leaders
- Maybe some colleagues from collaborators could be qualified for sub-shift leaders, so that continuous operation could be provided
  - This could in principle increase duration of operation from 21 weeks \* 4.5 days (typical, if beam starts Monday afternoon) to 21\*7, that means by 50%!
  - This will also make machine more stable and ease the work



# Proposed shift scheduling process

Based on discussed monthly task plan:

- identify task leader + support group for each task
- obtain from each task group work plans with time-line + estimated beam time requests

Obtain from each ATF2 participant willing to contribute to the commissioning his / her “anti-shift” schedule (i.e. beam-time periods when unavailable)

Construct initial beam schedule based on:

- monthly task plan (sequenced / parallel)
- individual task plans
- collaborators' availability

taking into account:

- different levels of experience

Adjust final beam schedule after discussion with each contributor. Likely will need some iteration & negotiation & **flexibility**.

## January 2009

### Hardware works

Install and uninstall of fast kicker and in-vacuum septum magnet.  
Install the post-IP C-band BPM  
Calibrate the stripline BPM readout electronics  
Fine alignment of ext. and ATF2 line magnets  
Install the wide aperture QM7R  
Install the QS2X

### Beam time ( Two weeks, 21 shifts )

Fast Stripline Kicker study  
Cold Cavity BPM study / RF gun at linac.

If possible,

- DR fine tuning
- DR optics diagnostics and BBA
- Cavity Compton study

and other DR studies

### ATF2 beam time in February – March ( 30 shifts or more )

#### Priority studies are hardware related works

Physical alignment check with beam ( kicker, chamber, ... )  
Calibration of BPM and BBA (EXT and FF)  
Commissioning of carbon wire scanner  
Optics modeling and magnet strength test with beam  
Commissioning of IP-BSM

#### Beam tuning developments

Beta matching from DR to EXT ( check of QM7R )  
Beta matching from EXT to FF  
Coupling correction with 2 skew quads  
Dispersion correction  
Beam size tuning with carbon wire  
Slow orbit feedback

## February – March 2009

### Hardware works

Realignment of linac and BT line  
Install the FONT kicker and BPM  
Install the laser wire  
Install the IP-BPM ?

### Beam time ( 5 weeks, 60 shifts )

30 shifts will be able to spent by DR and other ATF R&D.

DR optics diagnostics  
DR emittance tuning  
FONT  
Laser wire  
Fast Ion Study  
Cavity Compton and so on.

## April – May 2009

### Hardware works

Install the IP-BPM ?  
Install the sweeping magnets ?

### Beam time ( 5 weeks, 60 shifts )

DR and other ATF R&D.

DR optics diagnostics and tuning  
FONT, Laser wire, Fast Ion, Cavity Compton, ...

#### ATF2 studies

Beta matching  
Coupling, dispersion correction  
Beam size tuning with carbon wire  
First trial to beam size tuning with IP-BSM  
Slow orbit feedback  
IP feedback test ?

- **Publication Policy**
  - Summary of PAC09 abstracts & discussion of Publication Policy Andrei Seryi (SLAC)
- **Extra session**
  - AML to SAD conversion for Flight Simulator Mauro Pivi (SLAC)
- **ILC-BDS Joint Session**
  - Minimal machine Deepa Angal-Kalinin (STFC)
  - Crab cavity R&D Peter McIntosh (STFC) Andrei Seryi (SLAC)
  - The ultra-low betas recent studies Rogelio Tomas (CERN)
  - Monalisa in detectors David Urner (University of Oxford)
  - Stability issue Andrea Jeremie (LAPP), Benoit BOLZON (LAPP)
  - AAP review April 2009 Marc Ross (FNAL)

9:00				
12:00				
13:30	Introduction -start at 14:00  Comm. status  Specil seminar at 17:00 -	Beam dia. at EXT -start at 13:00  Align. & stability  IPBSM	Publication policy  Joint w. ILC-BDS	TB/SGC Proposals (4)  closed session  Conclusion

16:30, ATF Daily operation meeting

18:00- Banquet

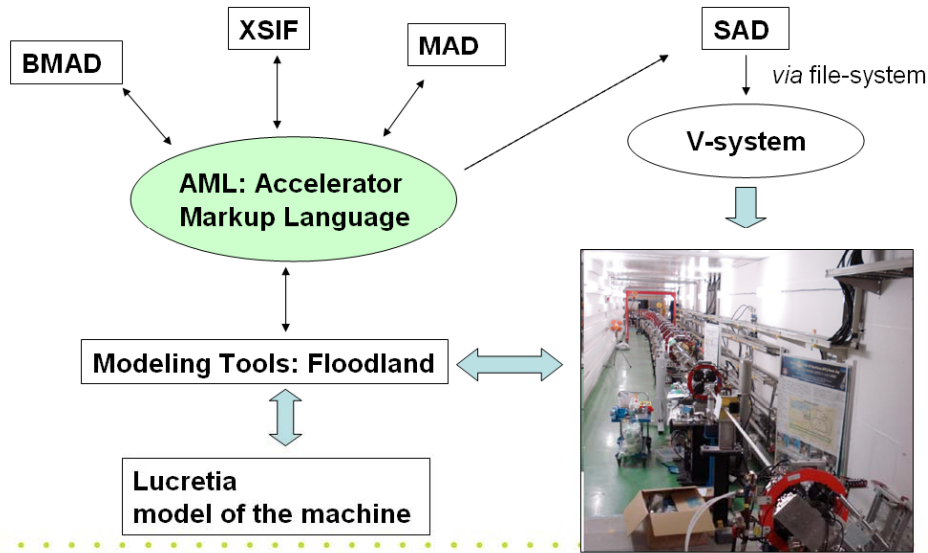




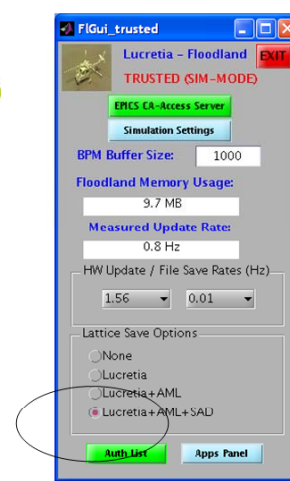
# Goal of ATF publication and presentation policy, for discussion

- The purpose of the ATF Publication and Presentation Policy is to:
  - 1. Assure scientific integrity of ATF scientific and technical results
  - 2. Assure appropriate recognition of individual and institutional contributions
- The goals in formulating the policy are to:
  - 1. Promote the timely publication of results
  - 2. Promote the visibility of ATF scientists and engineers, and especially, to encourage younger scientists and engineers to participate in the presentation and publication of results.
  - 3. Provide an efficient mechanism for the internal review and be conducive to publication.
  - 4. Promote open and free exchange of ideas and information within the ATF while research projects are being formulated and carried out.

Text is adapted from LIGO publication and presentation policy

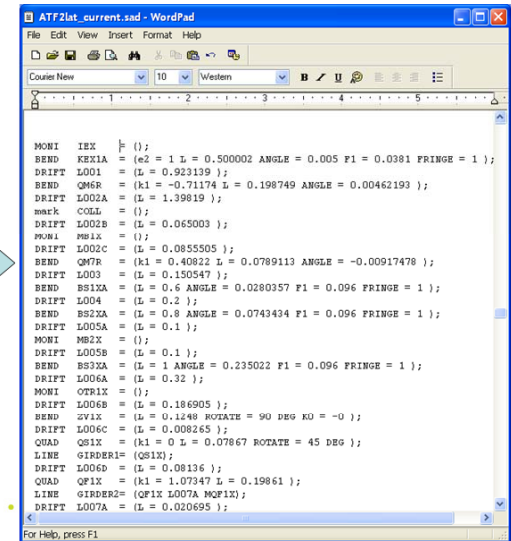


### Flight simulator panel

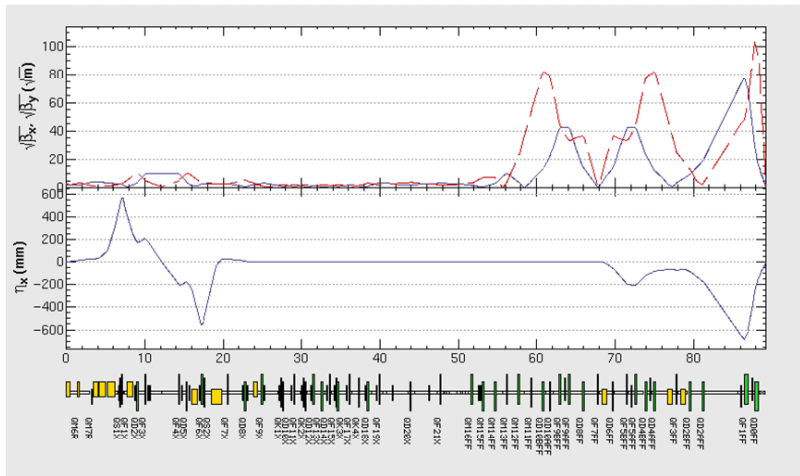


ATF2 Meeting, KEK, December 2008

### SAD beamline file

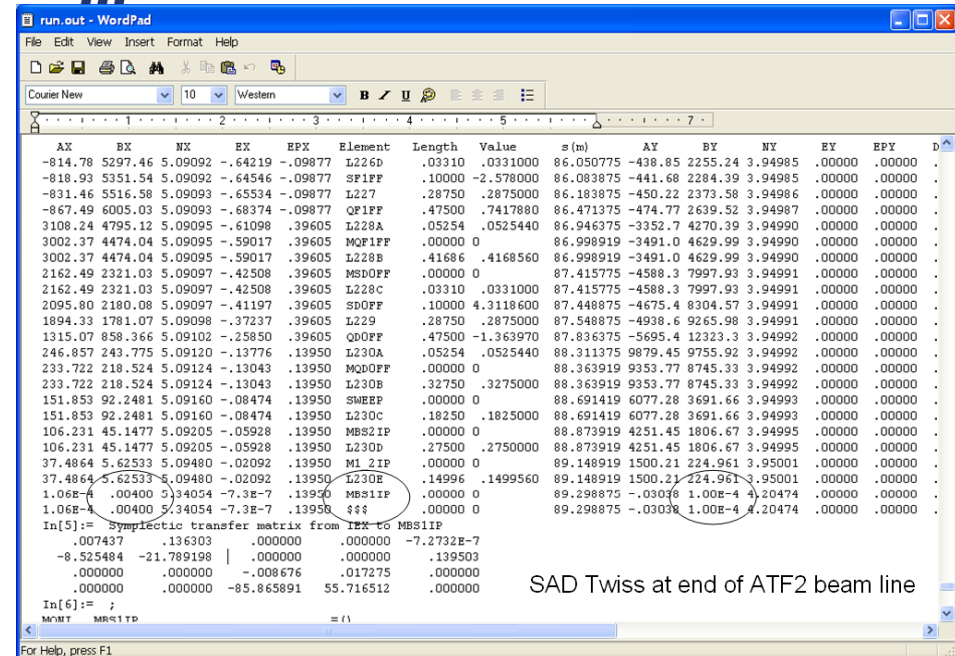


### Translation to SAD of ideal ATF2 Lucretia lattice



Obtained at IP BX\*=4.00mm, BY\*=1.00E-4m (--> Perfect agreement with Lucretia model)

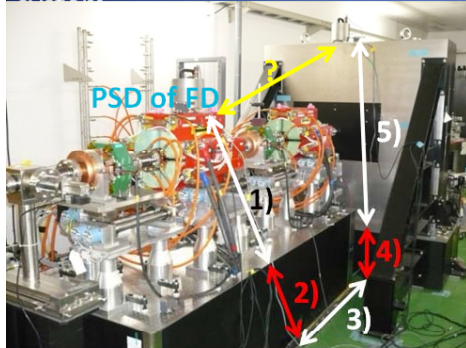
ATF2 Meeting, KEK, December 2008



SAD Twiss at end of ATF2 beam line

## Best curve of stabilization for final doublets and Shintake

- ✓ Relative motion calculation between Shintake Monitor (SM) and Final Doublets (FD) with the Transfer Function (TF) of a stabilization



- 1) TF between FD and table (measured)
- ×
- 2) TF of active system for FD (to be find)
- ×
- 3) Floor TF between FD and SM (measured)
- ×
- 4) TF of active system for SM (to be find)
- ×
- 5) TF between SM and table (measured)

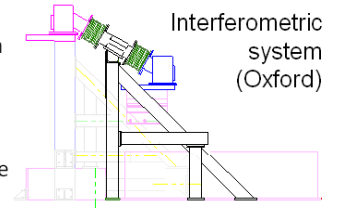
= FD motion PSD

Integrated RMS of relative motion between SM and FD

$$RMS_{int y-x}(k) = \sqrt{\sum_{k_1}^{k_2} [H(k)-1][H^*(k)-1]PSD_x(k)\Delta f}$$

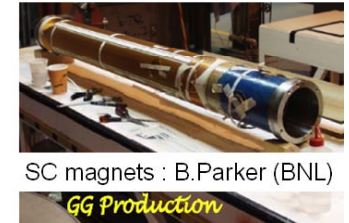
## Near future on ATF2/KEK Ongoing discussions

- upgrade the FD by new superconducting magnets constructed with the same technology as those of the International Linear Collider baseline FF magnets\*.
- study superconducting magnet vibration stability in an accelerator environment.
- incorporate cryostat design features that facilitate monitoring of the cold mass movement via interferometric techniques.
- incorporate a useful active stabilization for ATF2 to use as a CLIC prototype => limiting factor: the 0.1Hz lower limit
- evaluate with a new ground motion generator the ideal response function that an actively stabilized FD system would need to have to improve on the present ATF2 system.



Interferometric system (Oxford)

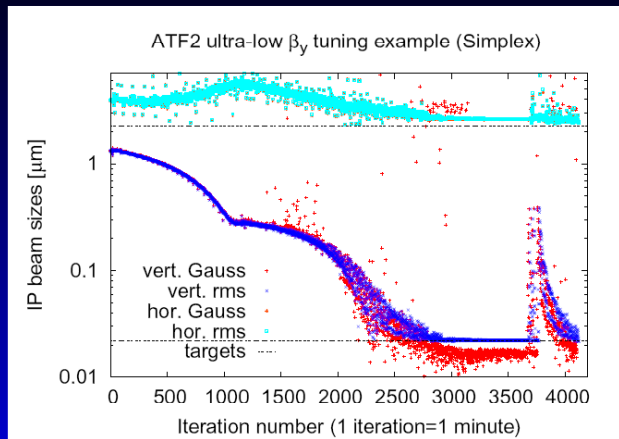
Teams involved: CERN, KEK, LAPP, Oxford, LAL, SLAC, BNL



SC magnets : B.Parker (BNL)

GG Production

## ATF2 ultra-low $\beta$ tuning example



## Summary table

case	Max. tuning time	Success	$\langle \sigma_y \rangle$
$\beta_y=0.1\text{mm}$	5.5 days	100%	43nm
$\beta_y=0.05\text{mm}$	8 days	90%	33nm
$\beta_y=0.025\text{mm}$	10 days	80%	26nm
including multipoles			
$\beta_y=0.025\text{mm}$	10 days	70%	29nm

$(\epsilon_x = 1.2\text{nm})$



# Goals at this meeting

## 1. Agreement of “monthly” milestones by 2010

- suggestion base on beam size

## 2. Detailed plan for sub-systems

- DR emittance, IPBSM, IPBPM (2nm) , Monalisa and FONT etc.
- ILC like bunches by the fast kicker
- control and tuning software, i.e. serialization of the tasks

## 3. Detailed schedule by end of March, 2009

- Installation/removable of fast kicker study
- Installation of new QM7R('s)
- re-alignment of beam lines ( BT and FF )
- IPBSM commissioning with 8 and 2 degree modes
- DR emittance to be  $\varepsilon_y=24\text{pm}$  by end of February, 2009

## 4. Agreement of publication policy