



# ATF2: Summary of Scheduling Strategy Session



Grahame Blair

Second ATF2 Project Meeting,  
KEK,  
1<sup>st</sup> June 2006

- Feedback and Feedforward systems
- Fast Kicker for ILC bunch train structure
- Laser-wire
- Shintake system
- IP-BPM and BSM with laser cavity

# P. Burrows: Feedback and Feedforward

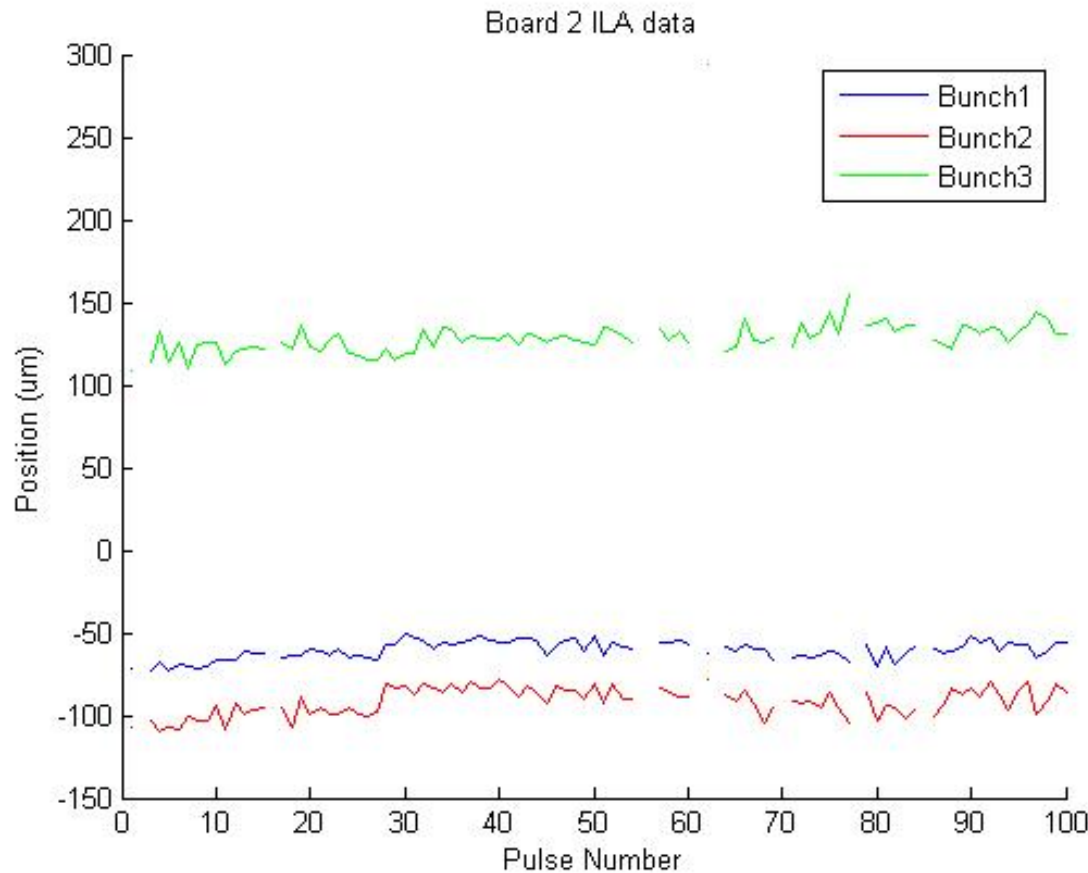
## How to achieve required stability?

- Feedforward ring -> extraction line  
Single or multibunch beam
- Feedback/feedforward in extraction line  
Multibunch beam

In either case probably want to correct  $y$  and  $y'$

- Few  $\mu\text{m}$  stability: stripline BPM resolution probably ok
- Sub- $\mu\text{m}$  stability: probably need cavity BPM resolution

## 3-bunch extraction: 154ns spacing



**RMS y jitter  
w.r.t bunch 1:**

**5  $\mu\text{m}$  (bunch 2)**

**20  $\mu\text{m}$  (bunch 3)**

**Train-train jitter:  
8  $\mu\text{m}$**

**Banana: 220 $\mu\text{m}$**

- Train-train jitter cannot be corrected by FB because intra-train jitter is comparable in size (larger)
- Banana effect  $\gg$  jitter: requires large dynamic range of kicker amplifier to straighten train

## Questions + Issues

Where to put hardware?

FB mode + FF modes

Decide locations and either install or leave space

What type of BPM and where?

Dedicated stripline, cavity BPM

Beam feedback requires multi-bunch beam

Need to think about how to handle multi-bunch operation in IP BPMs at ATF2

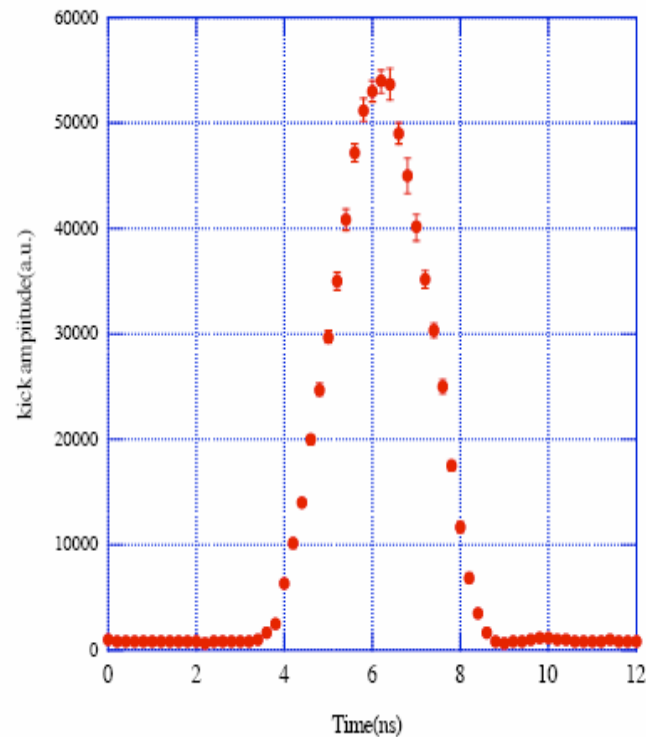
# Beam extraction by using strip-line kicker (T. Naito)

## kicker system

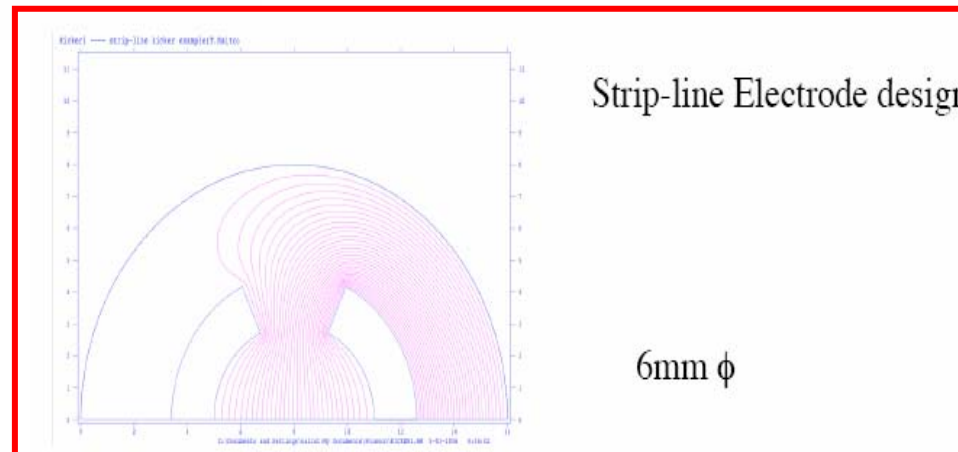
The kicker unit, which consist of the strip-line electrode and the fast high voltage pulse power supply, makes the very fast kick field,  $\sim 3\text{ns}$  rise/fall time.

20~40 units will be used to get the total kick angle(0.6mrad) at 5GeV,  $\beta=50\text{m}$ .

Beam kick profile(30cm strip-line, 5kV FID pulser)



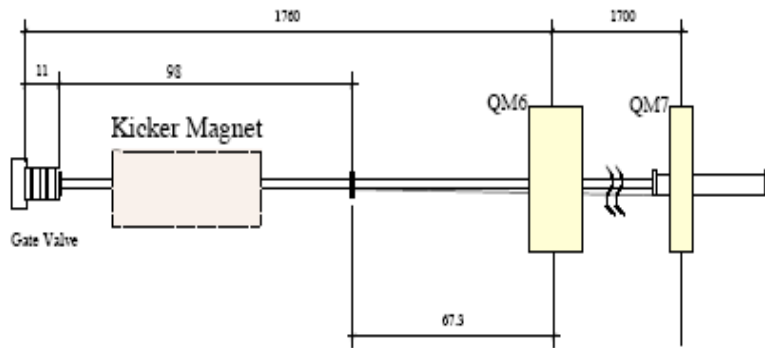
Rise time  $\sim 3.2\text{ns}$   
Kick angle  $\sim 85\mu\text{rad}$   
(calc.  $94.7\mu\text{rad}$ )



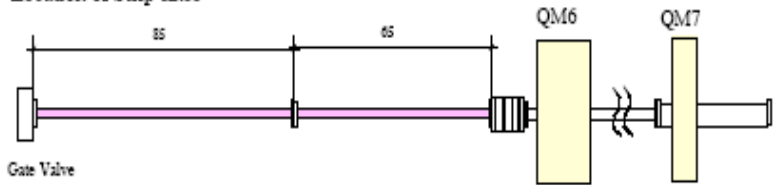
# Orbit Design

20051017 T.Naito

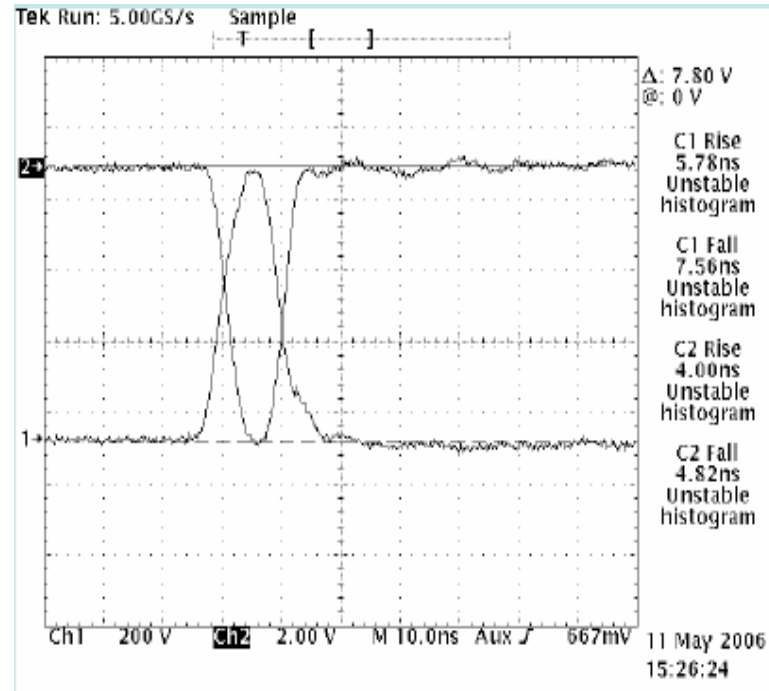
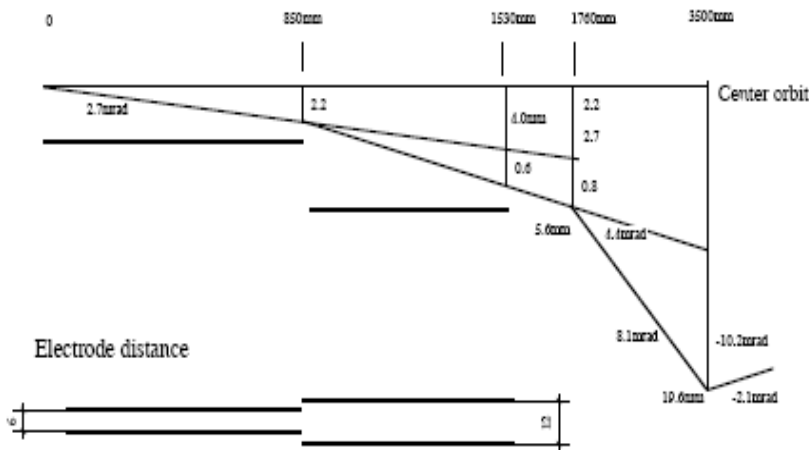
Present layout



Location of Strip-lines



Design Orbit

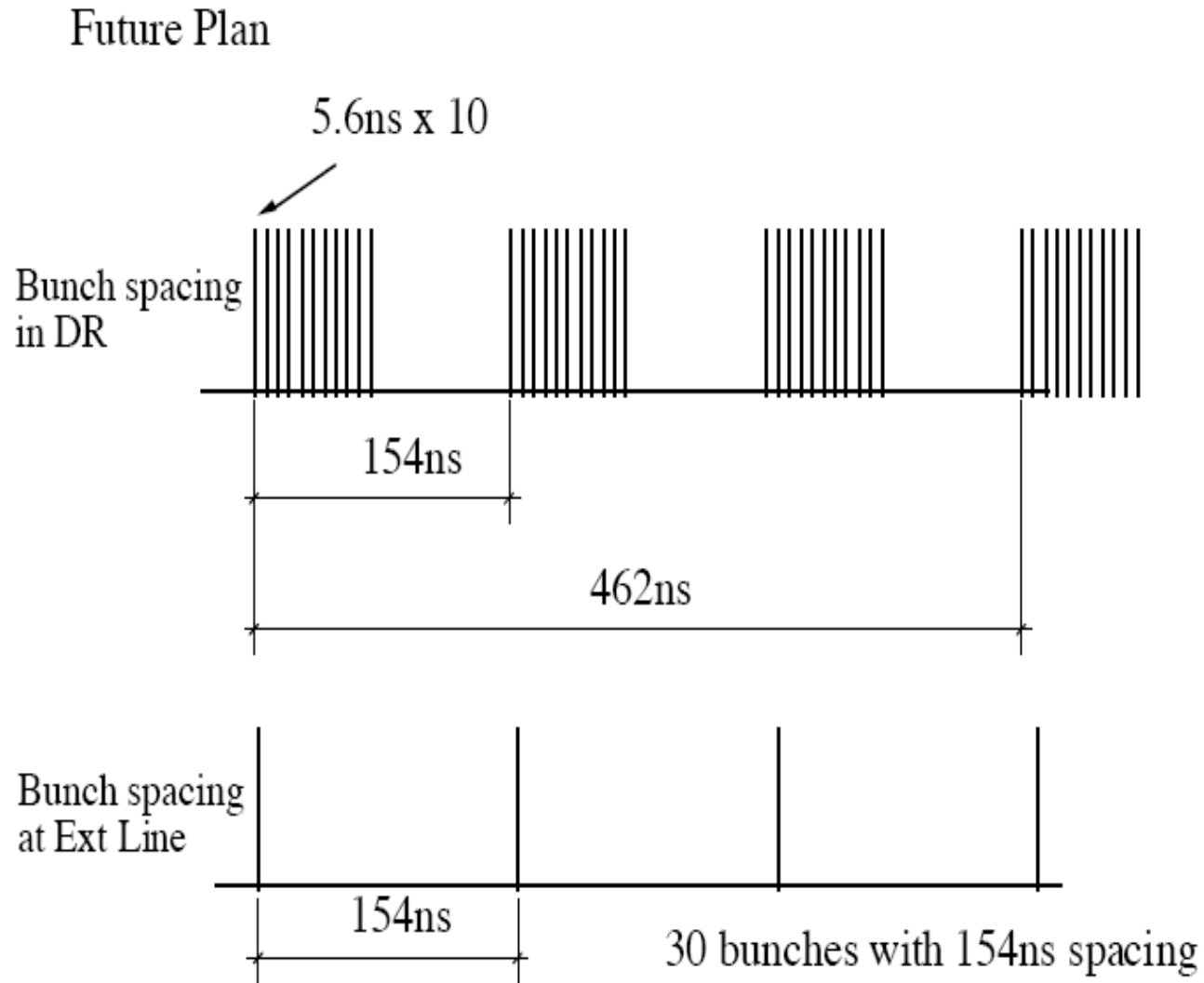


LLNL Inductive Adder Pulser  
 Uses stacked FET boards  
 to achieve:

Rise time ~ 5.7ns

Pulse voltage ~ +- 8kV

# Plans exist to modify laser to produce arbitrary bunch spacing



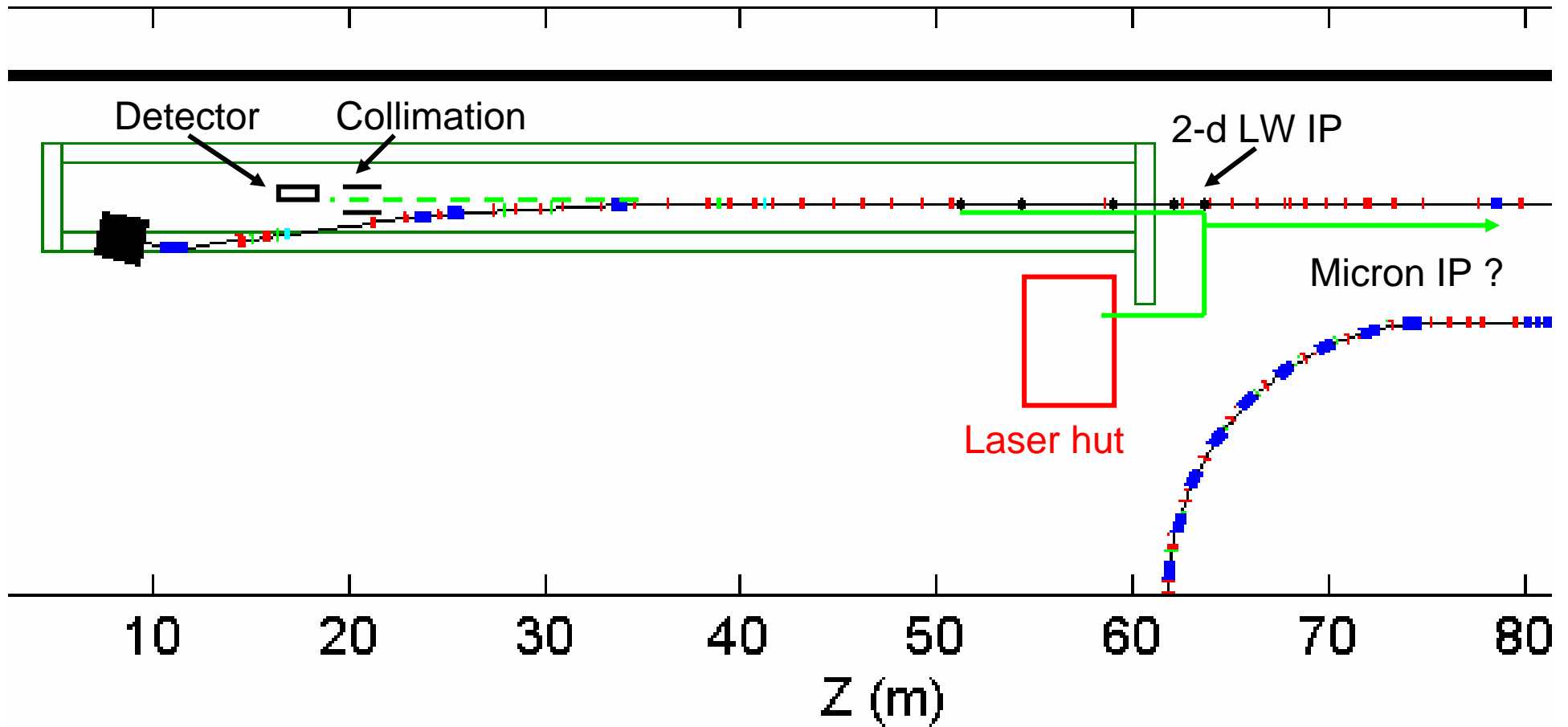
# ATF2 LW Plans (G.Blair)

A 3-stage approach is foreseen

- Start with installation of laser hut
- First stage of light transport system
- Single 2-D LW-IP system
- Add IP's as project progresses
- Highly desirable to include a micron-size IP, possibly in the upstream S-bend area.



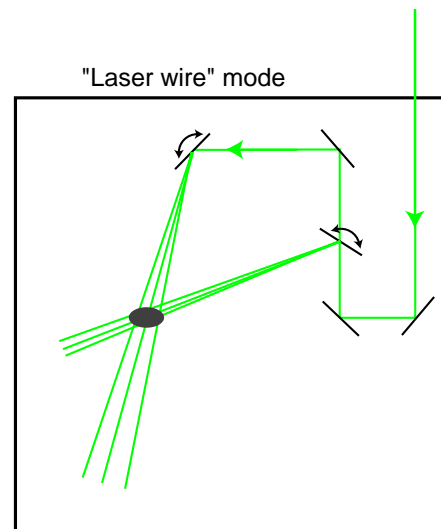
# Possible Stage 1-3



Final number of IPs will depend on level of funding

# Shintake System (T. Suehara)

- Vertical
  - 20 ~ 360 nm ( $30^\circ$  ,  $174^\circ$  setup, 10%~90% modulation)
- Horizontal
  - 380 ~ 1800 nm ( $6^\circ$  setup, 10%~90%)
- For commissioning,  
Beam size larger than 360nm (V) 1800nm (H)  
should be covered by another monitor
  - Solid wire  
(before or with Shintake-monitor, IP or non-IP)
  - “Laser wire” mode:



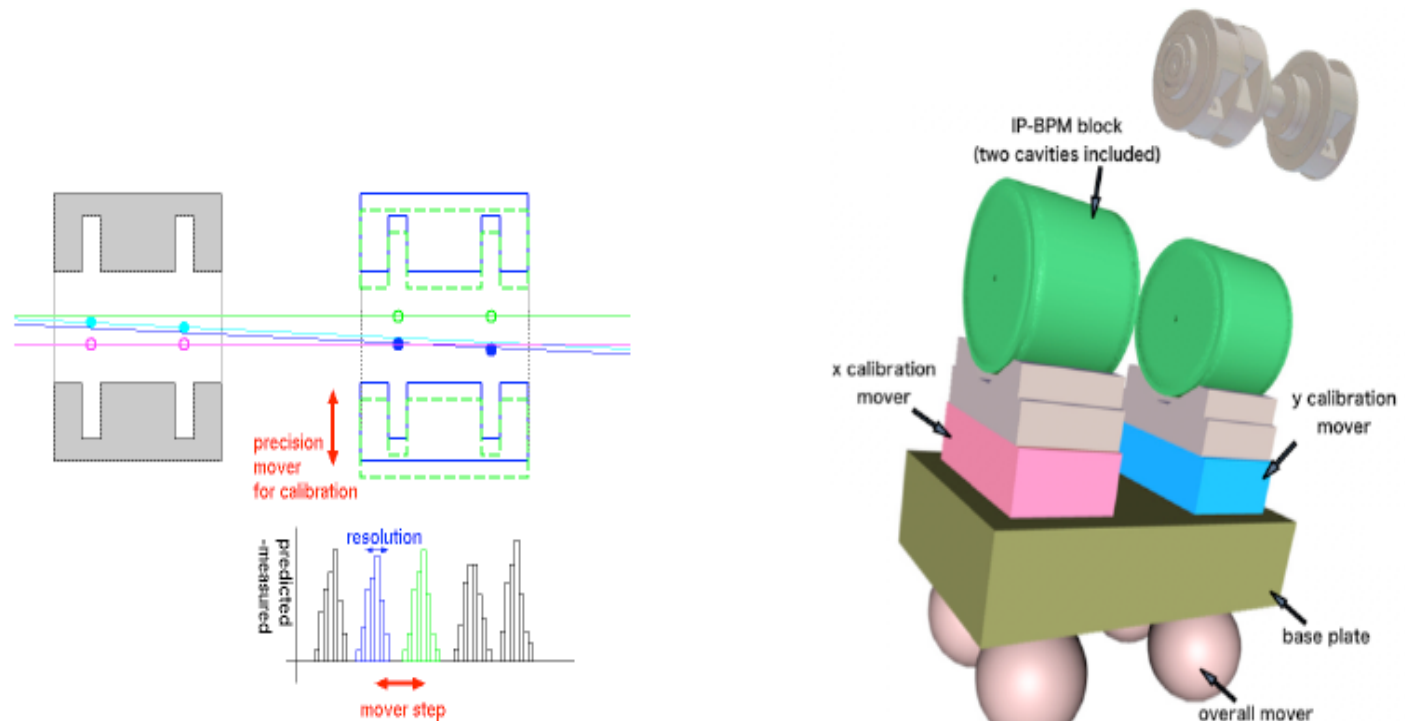
# Commissioning schedule: ATF2 plan

- R&D finished : Aug. 07
- Transportation to KEK : Sep.07
- Unpacking & component check : Oct.07
- Wait until rough beam tuning finished (?)
- Installing & system check : ~Dec.07 (if no wait)
- Tuning with beam : Feb.08 ~
  - Tuning to reduce background
  - Beam tuning with “Laser wire” mode ?
  - Measurement using interferometer mode

# IP-BPM

Y.Honda

- So far, still just in the start of R&D phase. No guarantee for the schedule
- Prove the resolution at existing ATF extraction line
  - two sets of BPM block on precision movers
  - upgrading cavity/electronics
  - PAL group will try alternative design of cavity
- After the first commissioning of ATF2 (after beam path to the dump established)
  - Install this downstream of Suehara monitor
  - Check the performance at the large divergence area
- Phase 2 of ATF2
  - Move to the IP
  - Connection with final doublet



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# U-BSM

- Just started a conceptual design. No guarantee for the schedule.
- Needed R&D
  - test the high finesse optical cavity and high power laser
    - Difficult but not impossible based on our experience
  - detector
    - Compton signal energy is 50% of Suehara's case
  - timing and beam collision
    - Not difficult
- Schedule
  - might become ready faster than it looks?
  - hopefully, concurrent starting up with Suehara monitor. As a back-up of it.

# Summary

- All projects have some good idea of their schedule
- New funding is being sought for some; outcome expected at the end of 2006
- General schedules will be drafted and gathered in time for the next ATF2 meeting.