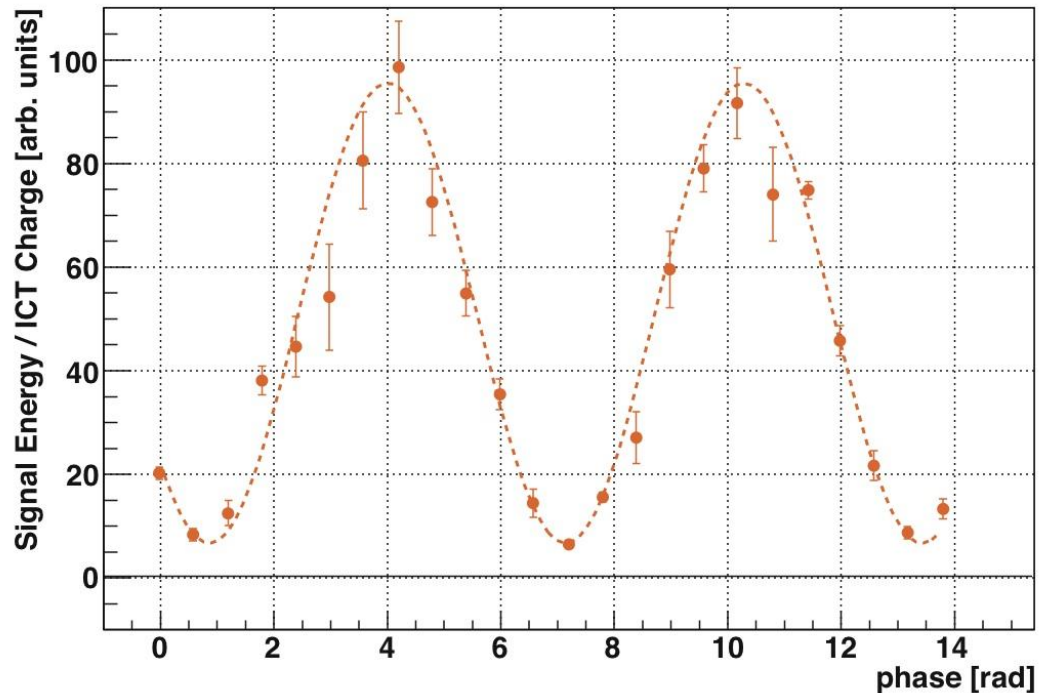


***Plans for continuous run operations  
in 2010 autumn run period***

10<sup>th</sup> ATF2 Project Meeting  
2010 / 6 / 30  
Toshiyuki OKUGI, KEK

In 2010 spring run,

we performed 1<sup>st</sup> trial of the ATF2 continuous operation with 4cm  $\beta_x$  and 1mm  $\beta_y$  optics.



In the continuous operation,  
we achieved the 0.87 of the modulation depth at 8.0 deg. Mode.

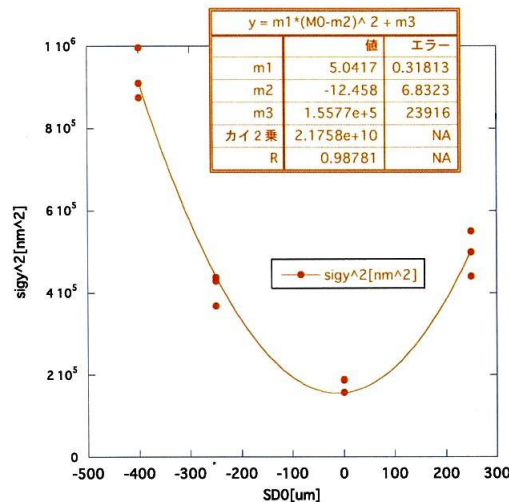
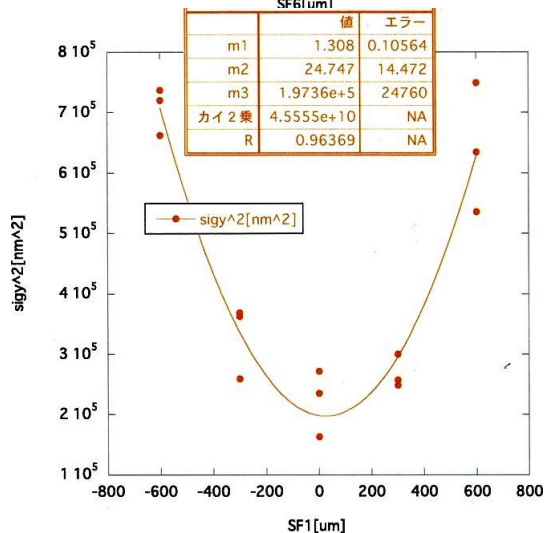
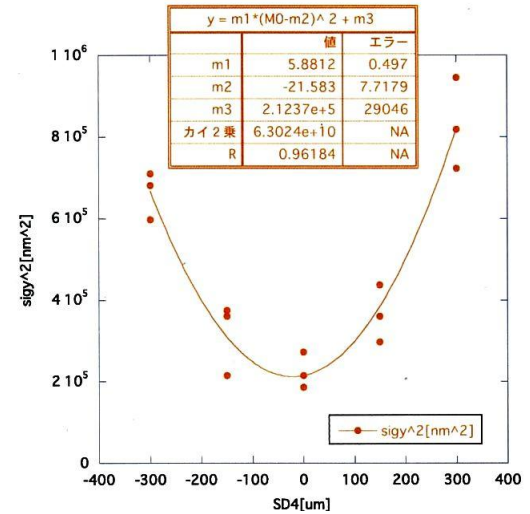
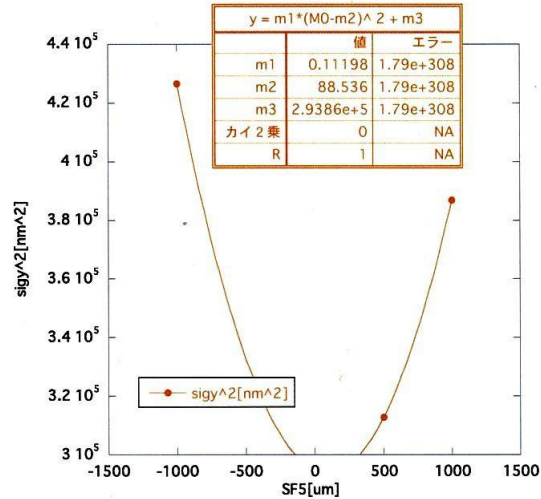
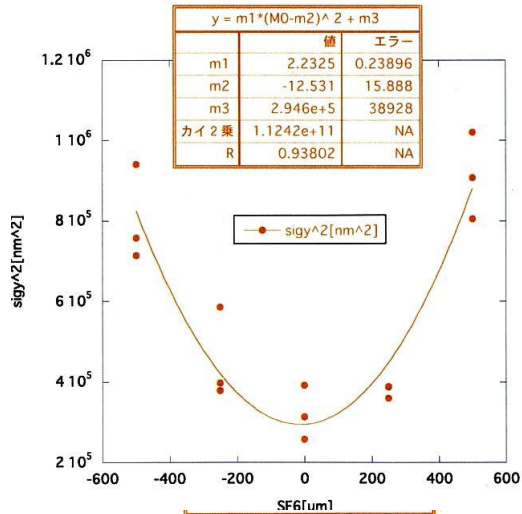
The evaluated vertical beam size is 310 +/- 30 (stat.) +0/-40 (syst.) nm.  
( The design beam size is 140nm for  $\epsilon_y=20\mu\text{m}$ . )

## **The candidate reason not to make the design beam size**

1. Imperfect of the beam size tuning
2. The effect of multi-pole fields of FD magnets
3. The effect of the beam jitter
4. The effect of the phase jitter of IP-BSM

# The minimum beam size was achieved after the vertical position optimization of individual FF sextupoles.

I believe the vertical position of FF sextupoles were not so bad at the continuous operation



**The  $\beta^*$  also checked to be design beta function  
at the beginning of the continuous operation with post-IP WS.**

**When Mark applied the IP beam size magnification knob,  
the measured beam size was not reduced.**

I believe the beta matching was not main reason  
why the measured beam size was not so small.

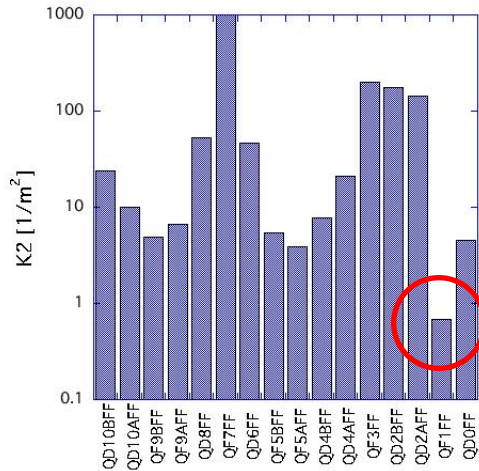
**However, we have never change the strength of FF sextupoles  
to check the chromaticity and geometric aberration.**

We need to scan the strength of FF sextupoles in 2010 autumn run.

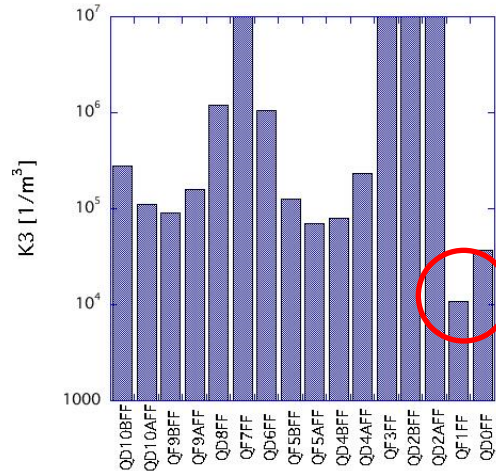
# The sensitivity of the multipole fields

The amount of the multi-pole fields to increase the vertical beam size to 300nm for the beam with 1nm horizontal emittance and 10pm vertical emittance

Skew 6-pole

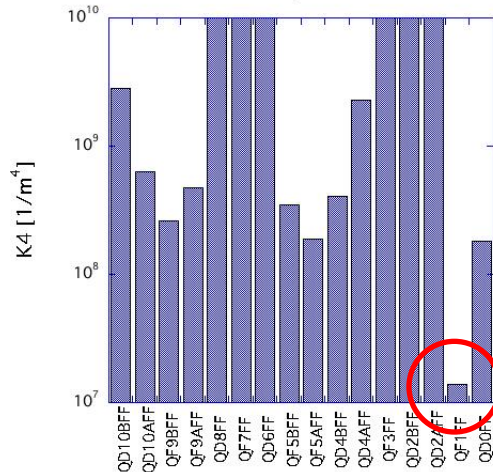


8-pole

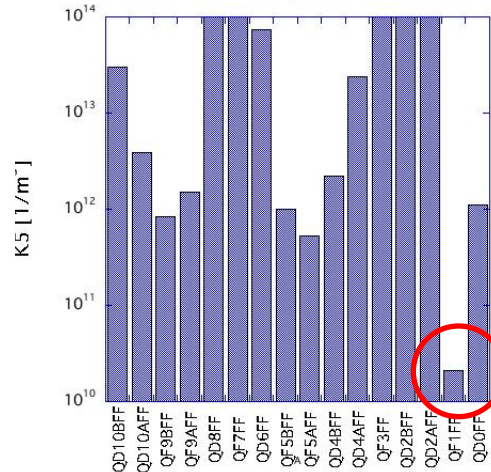


QF1FF is the most sensitive for all of the multi-pole fields.

10-pole



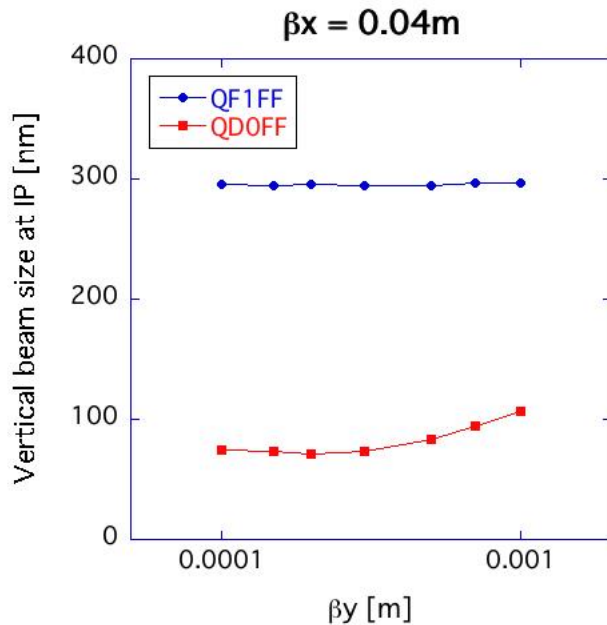
12-pole



QD0FF is comparable to the other FF quads.

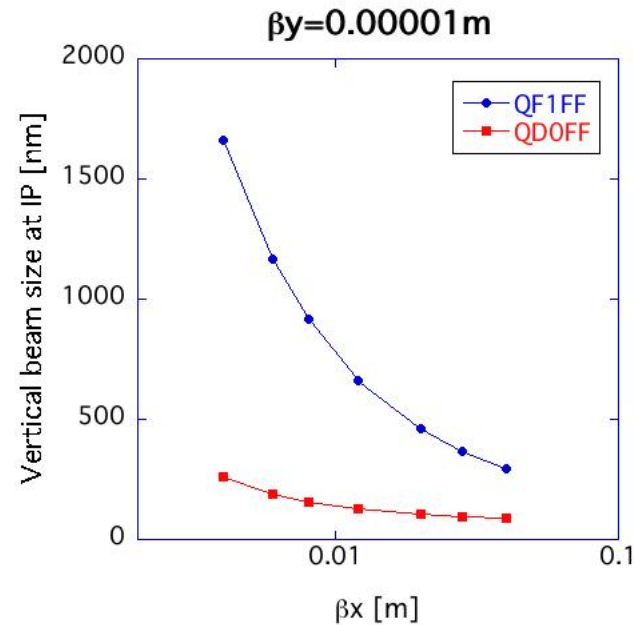
## When we assume the skew sextupole field of QF1FF is $K2S=0.68$ ( the amount to increase the vertical beam size to 300nm ).

This value is huge ( 30 times larger than the multipole field measured in SLAC ), but it seems that QF1FF has a huge mechanical roll (5-6mrad) .



The beam size stay same vale

Minimum beam size was 70nm at 0.3mm  $\beta_y$



Beam size is increasing for small  $\beta_x$  .

It is better to check the multipole field of FD magnets again.  
But, it is difficult to measure in KEK for no appropriate coils.

**Will we replace the FD magnets in this summer shutdown ?**

## To confirm the amount of the beam jitter, I propose to install the IP-BPM (KEK IP-BPM).

- Actually the IP-BPMs are located 5cm and 10cm from IP.
- The required performance of the IP-BPMs are
  - 30nm of the position resolution with 30um of the dynamic range.
  - 30nm is comparable to the IP beam size for nominal optics.
  - 30um is comparable to the beam size at IP-BPM (10cm from IP).
- However, since it is difficult to make fine alignment of the IP-BPM,  
we will fix the IP transverse position (beam and laser) to the center of the IP-BPM.

**Will we install the IP-BPM for next continuous run ?**

**To confirm the amount of the phase jitter of the IP-BSM,  
the phase monitor will be available by the IP-BSM group  
from 2010 autumn run.**



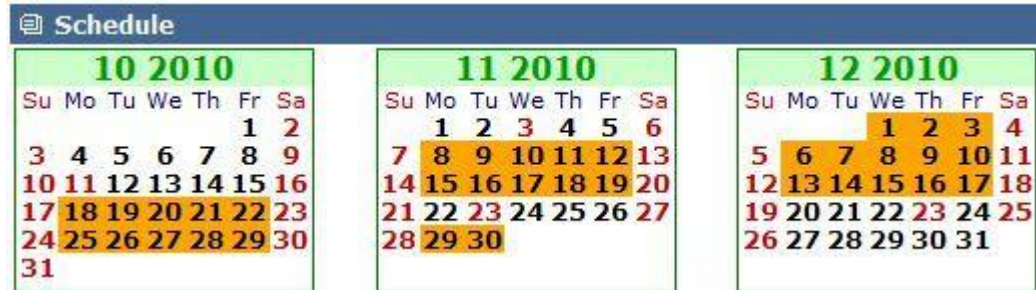
## **The works in the summer shutdown.**

1. Installation of phase monitor for IP-BSM
2. Installation of IP-BPM (??)
3. Check of the FD magnets (?? difficult in KEK)
4. Realignment and replace of FD magnets (??)

## **The preparation with beam before next continuous run.**

1. Background evaluation of the several beta optics to define the optics for next ATF2 continuous operation.
2. Commissioning of the IP-BPM (??)
3. Confirmation of the laser-beam collision at IP-BPM center (??)

# ATF operation plan in 2010 autumn run period



## In October 2010,

- we plan to continue the fast kicker study (maybe 1week).
- we plan the continuous operation to study multi-bunch, multi-train study in DR. (maybe 1week).

**Thereby, the nominal ATF operation will be started from November 2010.**

We have 5 operation weeks in 2010 autumn run period  
( 2 weeks in November, and 3 weeks in December ).

## The main purpose of the ATF2 continuous operation in 2010 autumn run

1. To find the reason why the measured beam size was twice as large as design one.
2. To make small vertical beam size as small as possible.

**Shall we discuss how many, when, how long  
will we take the ATF2 continuous run?**

### **Comment ;**

We must share the beam time to other study groups.

If we will install the IP-BPM, it is difficult to take the ATF2 continuous run twice ( November and December), because we don't have enough preparation time. We had better to concentrate the IP-BPM in November 2010.

If not, we will be able to take the continuous operation both in November and December. But, we will not have the priority to take other ATF2 beam tuning time in November.