IP instrumentation configuration for Autumn 2010 ATF2 runs

Toshiyuki OKUGI, KEK

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Final Doublet Issues

QD1FF seems to be rotated by 6.6mrad.
(see the presentation of Sugahara-san and me in 6/30)

Will we rotate the QF1FF by 6.6mrad ?
Will we check the multipole field of FD magnets?
Will we replace the QF1FF and QD0FF ?

We will have a special meeting to discuss the FD magnet issues.

Upgrade of the IP beam size measurement for initial IP beam size tuning

In the ATF2 continuous operation of 2010 spring run, we cut several tungstain wire at IP. Therefore, we will install the carbon wire scanners at IP.

The first meeting of the IP carbon wire issue was done at 6/10/2010.

- The new carbon wire fork will be prepared by SLAC.
- The fork will be made with ceramic to relax the themal stress to the wire.

Upgrade of the beam size measurement

In the ATF2 continuous operation of 2010 spring run,
the IP-BSM condition was changed while the beam size tuning,
and the IP-BSM had to be tuned sometimes.

Especially, the IP-BSM condition (laser path and optimum reducer setting)
was drifted in 5/21(Fri) for high outside temperature.
Therefore, we had better to make more reliable beam size measurement system
from 2010 autumn run.

1. The position drift

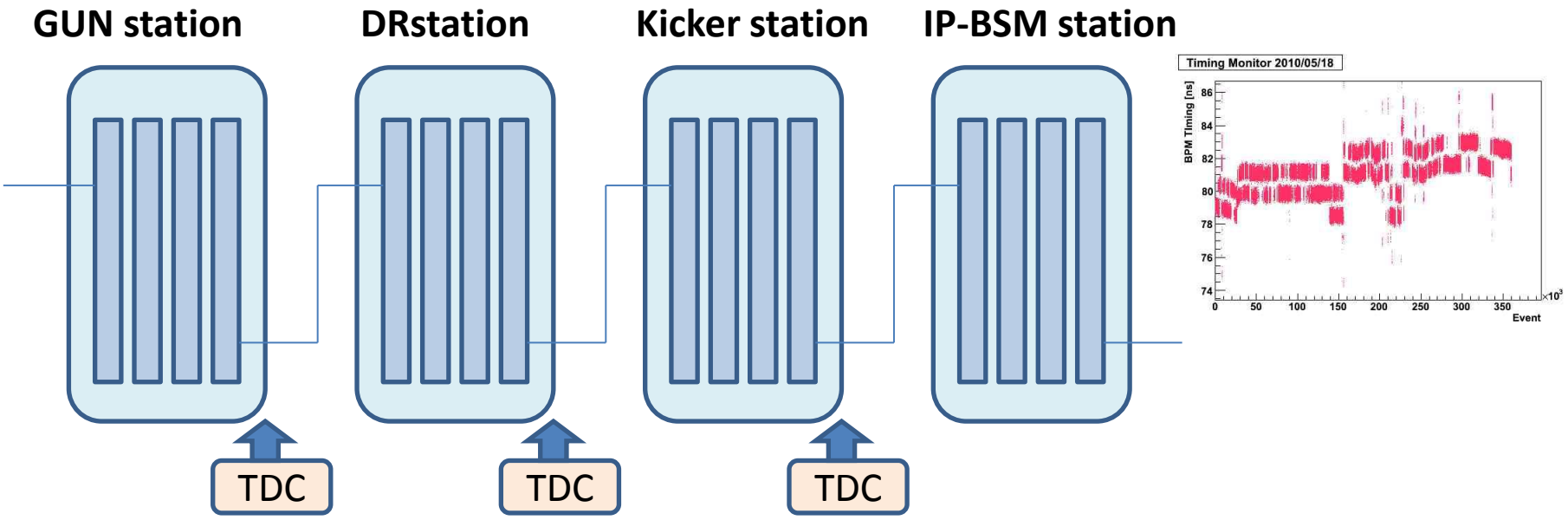
When the laser position with respect to beam is shifted by 10-20um,
the gamma-ray signal is reduced to be half and make the modulation depth worse.

- Electron beam
  - The IP-BPM helps to check the horizontal orbit drift.
    (We will have a special meeting to discuss whether will we install the IP-BPM or not).
  - We will apply the beam orbit feedback, if need.

- Laser beam
  - IP laser position monitoring will be started with PSDs.
  - We will apply the laser position feed back, if need.

2. Jitter of laser trigger timing.

When the trigger timing is jumped by 1count (2.8ns),
the gamma-ray signal was reduced to be 70% of the peak signal.



Several TDCs will be installed and be monitored in the beam size measurement
in order to identify the module with the timing jump.

Monitoring of the beam position jitter with respect to the IP-BSM laser fringe

- ***Electron beam***

  - The IP-BPM (KEK IP-BPM) helps to monitor the vertical beam position jitter
    (We will have a special meeting to discuss whether will we install the IP-BPM or not).

  - 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) for nominal optics.

  - 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.

- ***Laser phase jitter of IP-BSM***

  - The IP-BSM group plan to prepare the phase monitor in 2010 summer shut down.

Summary of IP instrumentation configuration for Autumn 2010 ATF2 runs

We will have two special meeting
- to discuss the FD magnet issues.
- to discuss the IP-BPM issues.
  - whether will we install the IP-BPM or not ?
  - what kind of readout electronics will we use ?
  - who will do the commissioning of the IP-BPM ?

We will install the IP-carbon wire scanner.

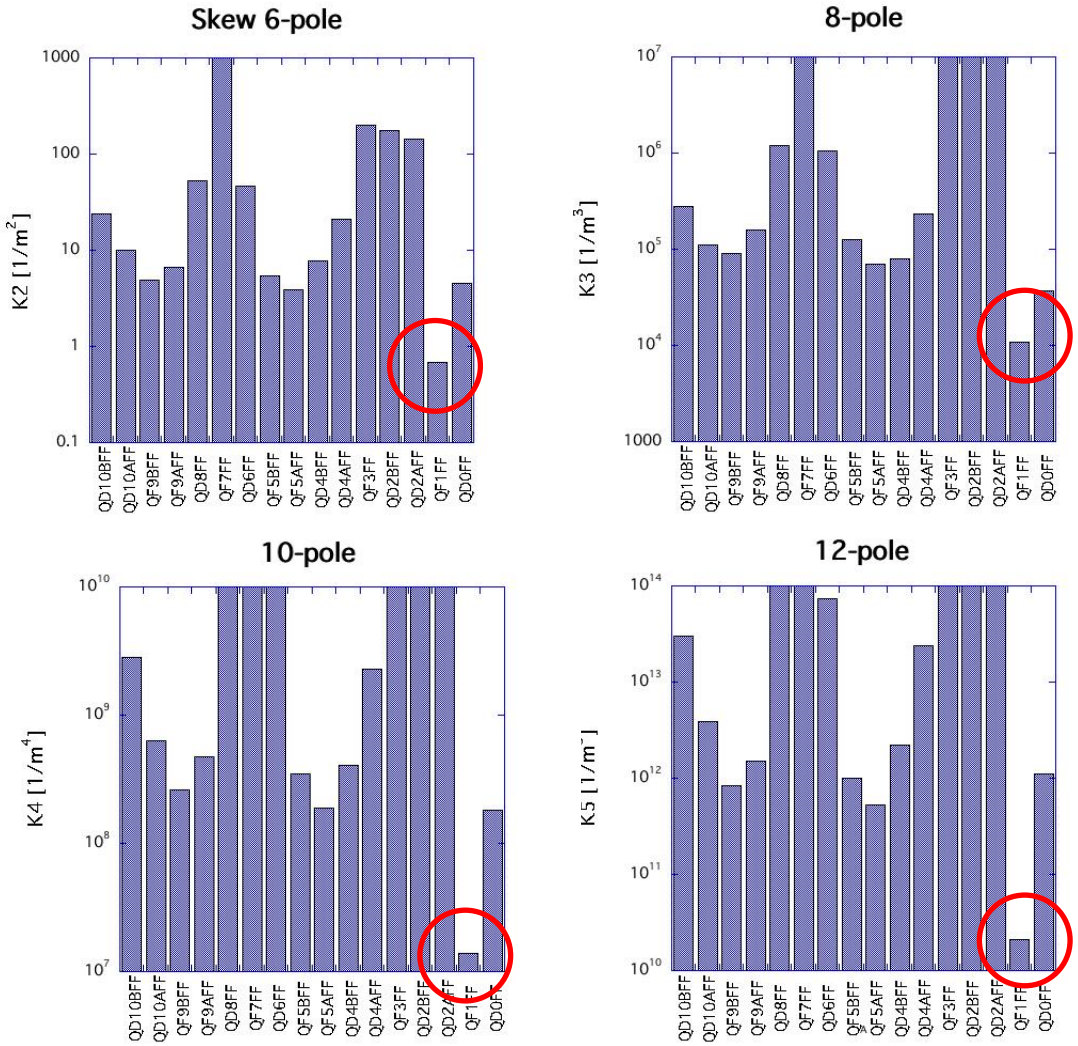
We will have upgrade plans of the beam size measurement.
- We will monitor the IP laser position with PSDs
  in order to monitor the laser position with respect to beam.
- We will monitor the horizontal beam position with IP-BSM, if agreed in the meeting.
- We will put several TDCs in each timing station
  in order to identify the module with the timing jump.

We will monitor the beam position jitter with respect to the IP-BSM laser fringe.
- The IP-BSM group plan to prepare the phase monitor.
- We will monitor the vertical beam position jitter with IP-BSM, if agreed in the meeting.

Backup Slides

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

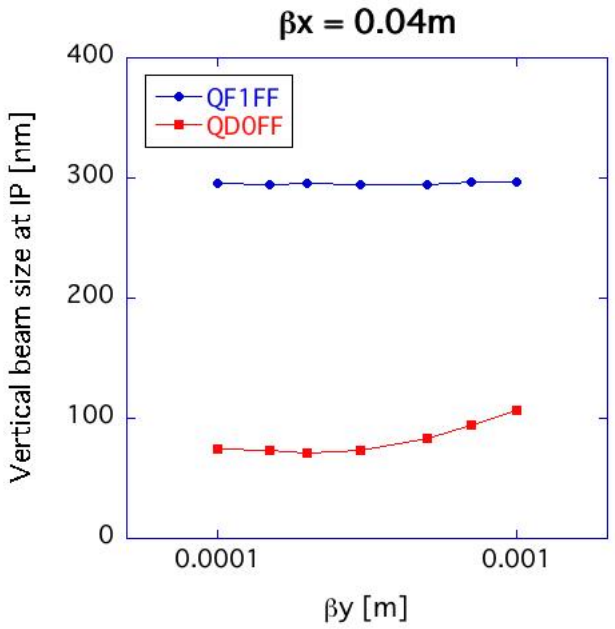


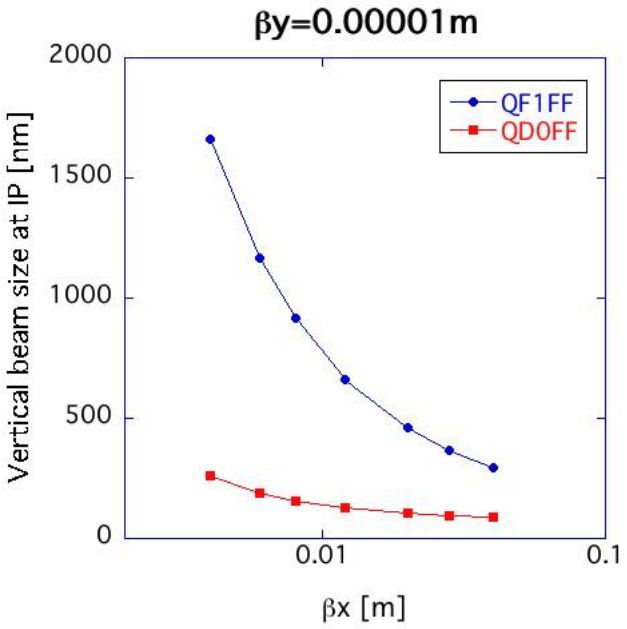
QF1FF is the most sensitive for all of the multi-pole fields.

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

Beam size is increasing for small βx .

Minimum beam size was 70nm at 0.3mm βy

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 ?