Status of FEATHER test

(FEedback AT High Energy Requirements)

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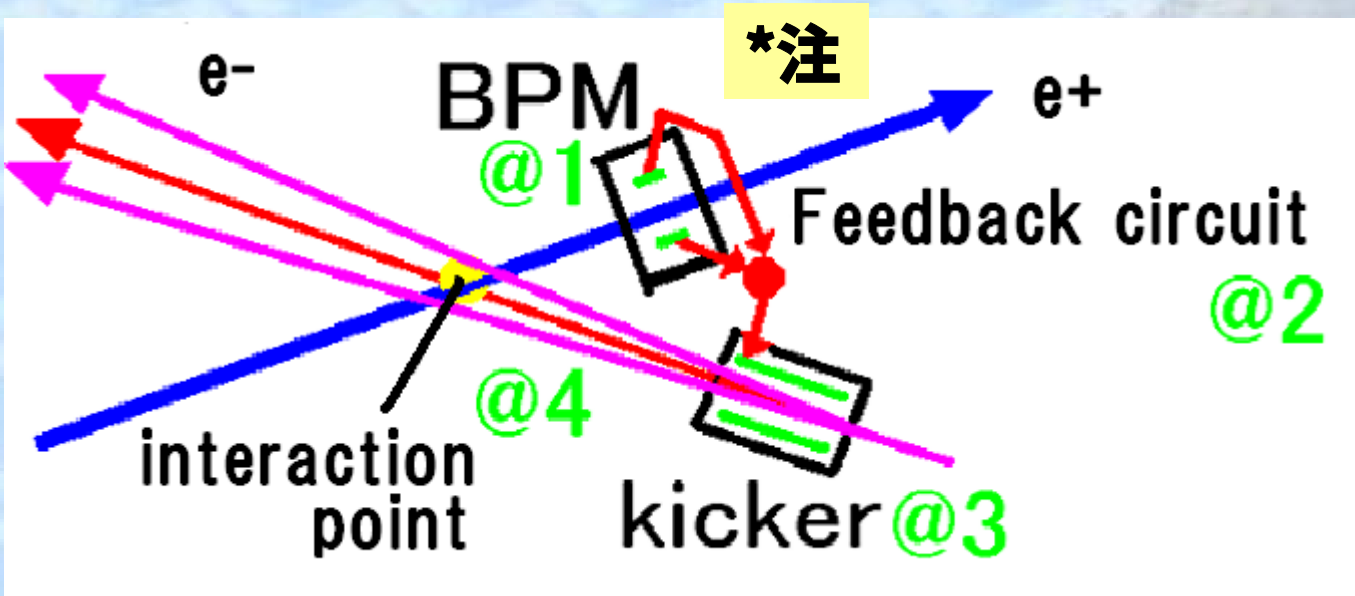
<Purpose=Feedback for the decrease of vertical offset at IP>



*注

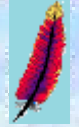
BPM=

Beam Position Monitor

1. Read the vertical position of the beam at BPM。 @1
2. Change the shape of the pulse at feedback loop。 @2
3. Put the pulse into the kicker。 @3
4. Decrease the offset at interaction point。 @4

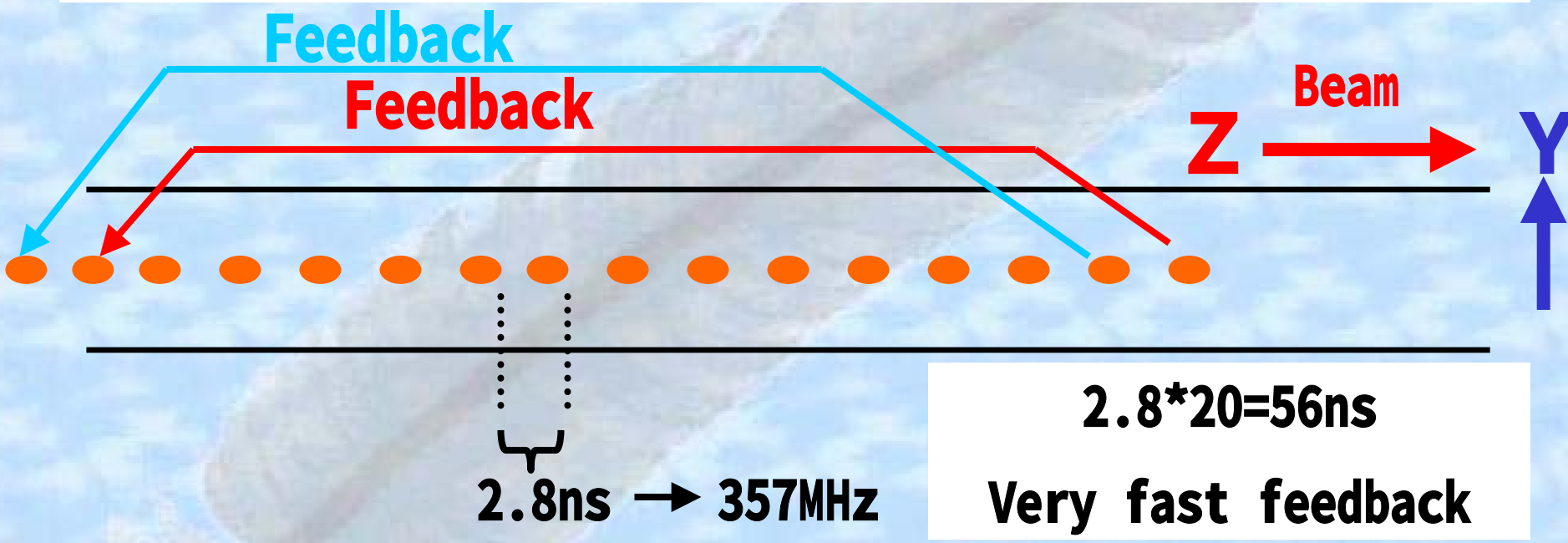
<Test at KEK:ATF (Accelerator Test Facility) >

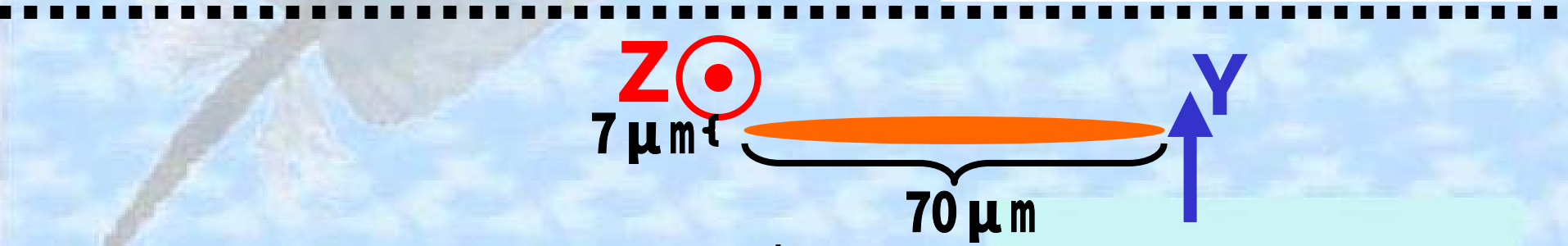
FEATHER (羽)



Beam of the ATF

Bunch space =2.8ns, 20 bunch

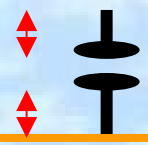




<set up of the kicker and the BPM at ATF>

kicker:Line type (2 electrodes)

BPM: button type(2 electrodes)



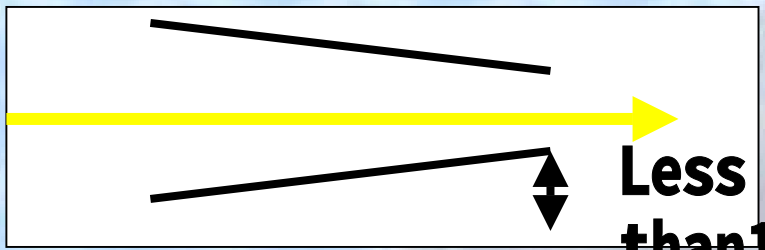
Characteristic = movable electrodes

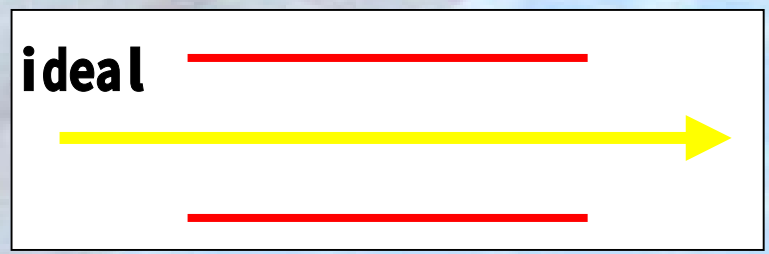
<Goal of the making movable kicker & BPM>

FEATHER (羽)

1.Electrodes have little tilt.

Goal: Tilt =< 100 μm





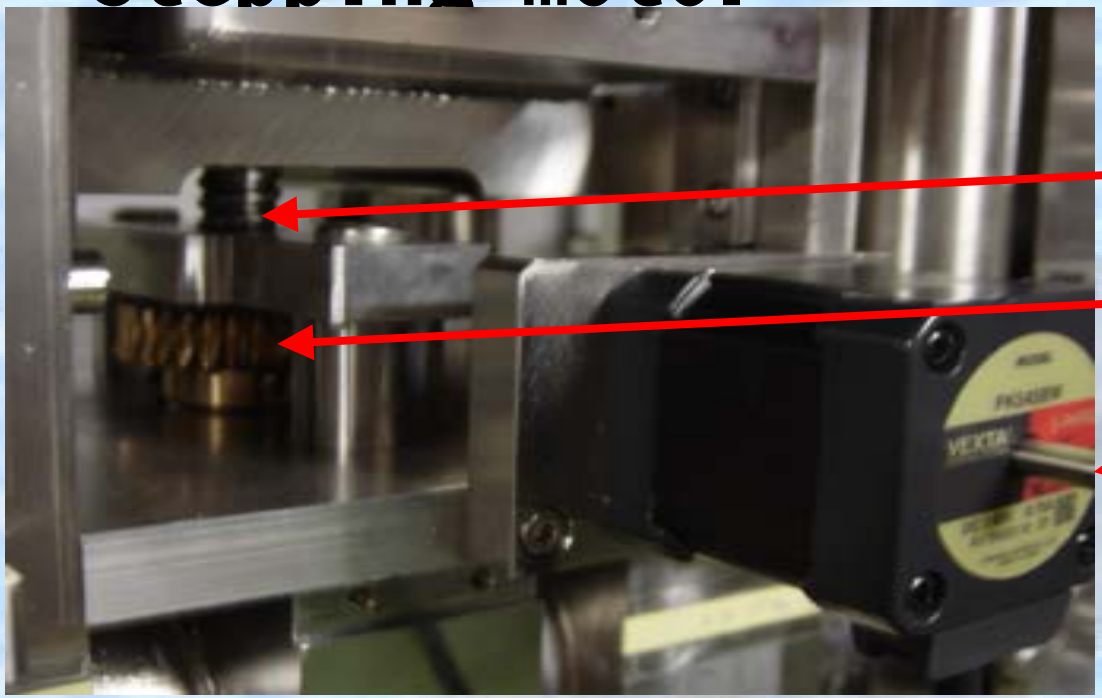
2.We want to do self calibration about the BPM.

We want to know a few μm.

Accuracy of the ATF's usual BPM is 20μm.

Goal:We can adjust the position of the BPM with 1μm Accuracy.

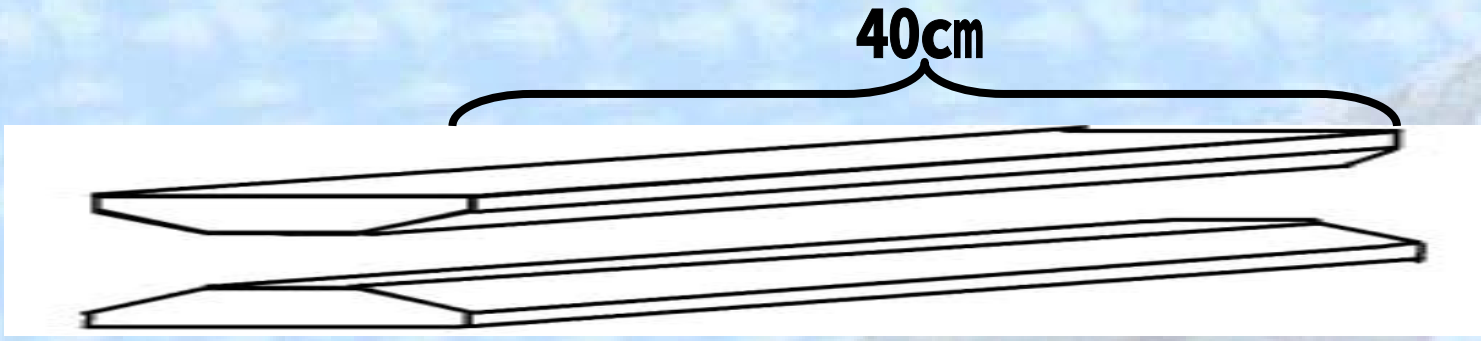
<Stepping motor>



< Gage>

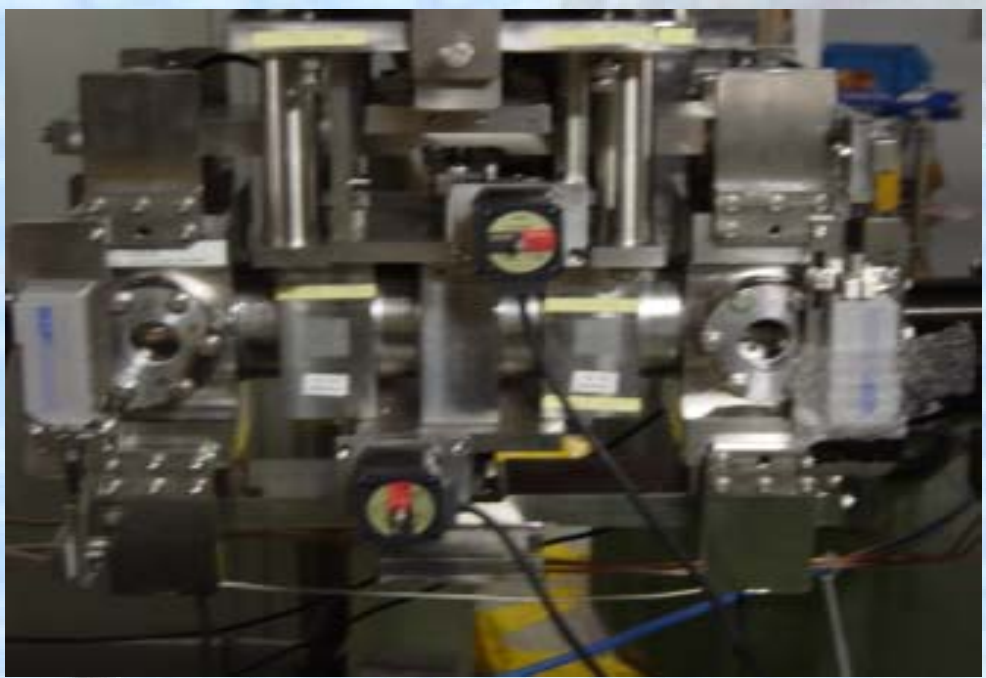
	accuracy	range	number
Kicker:	2μm	10mm	4本
BPM:	1μm	10mm	2本

<Electrode of the kicker>



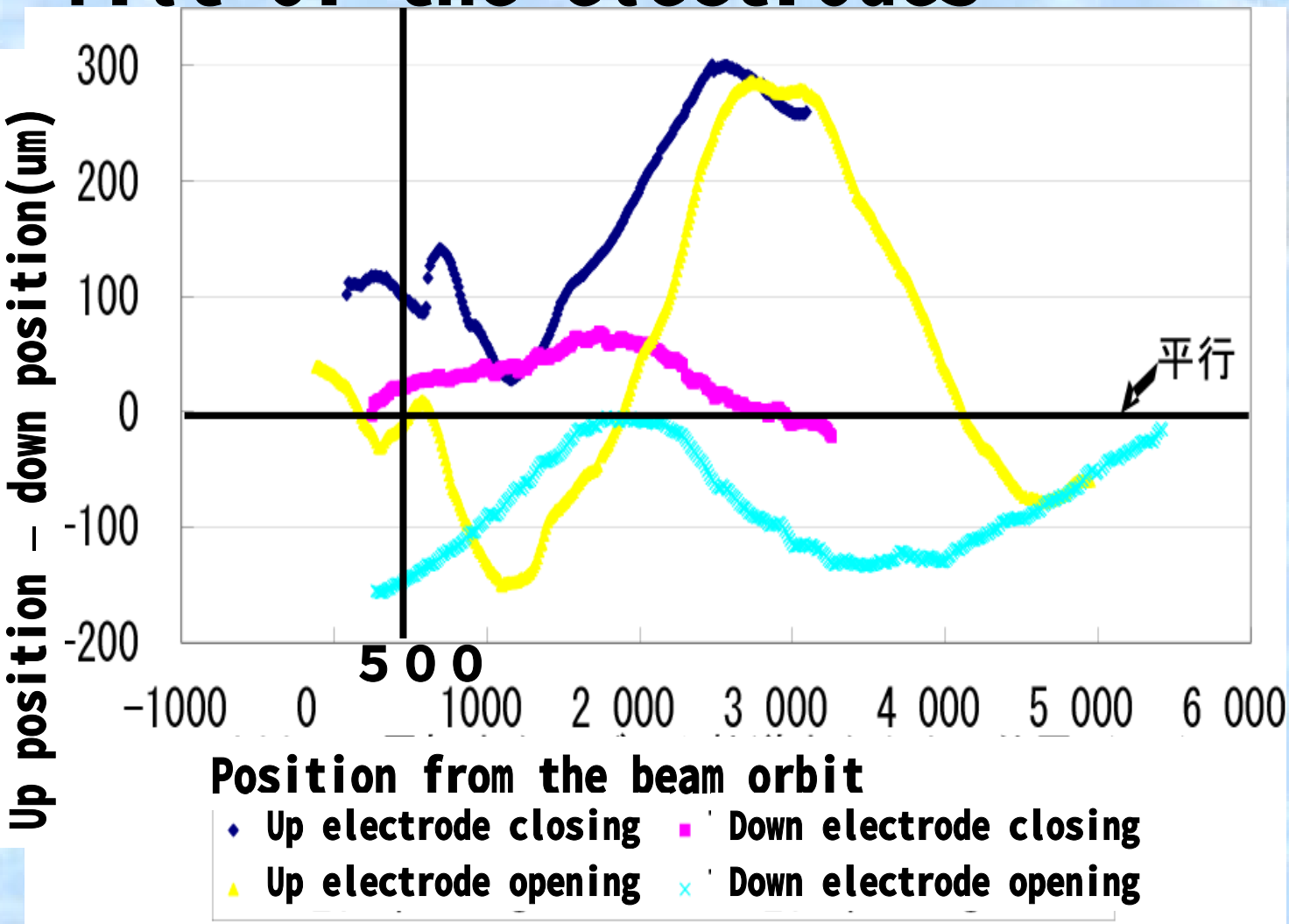
Impedance= 50 ohm at 1mm gap.

<kicker>



<BPM>

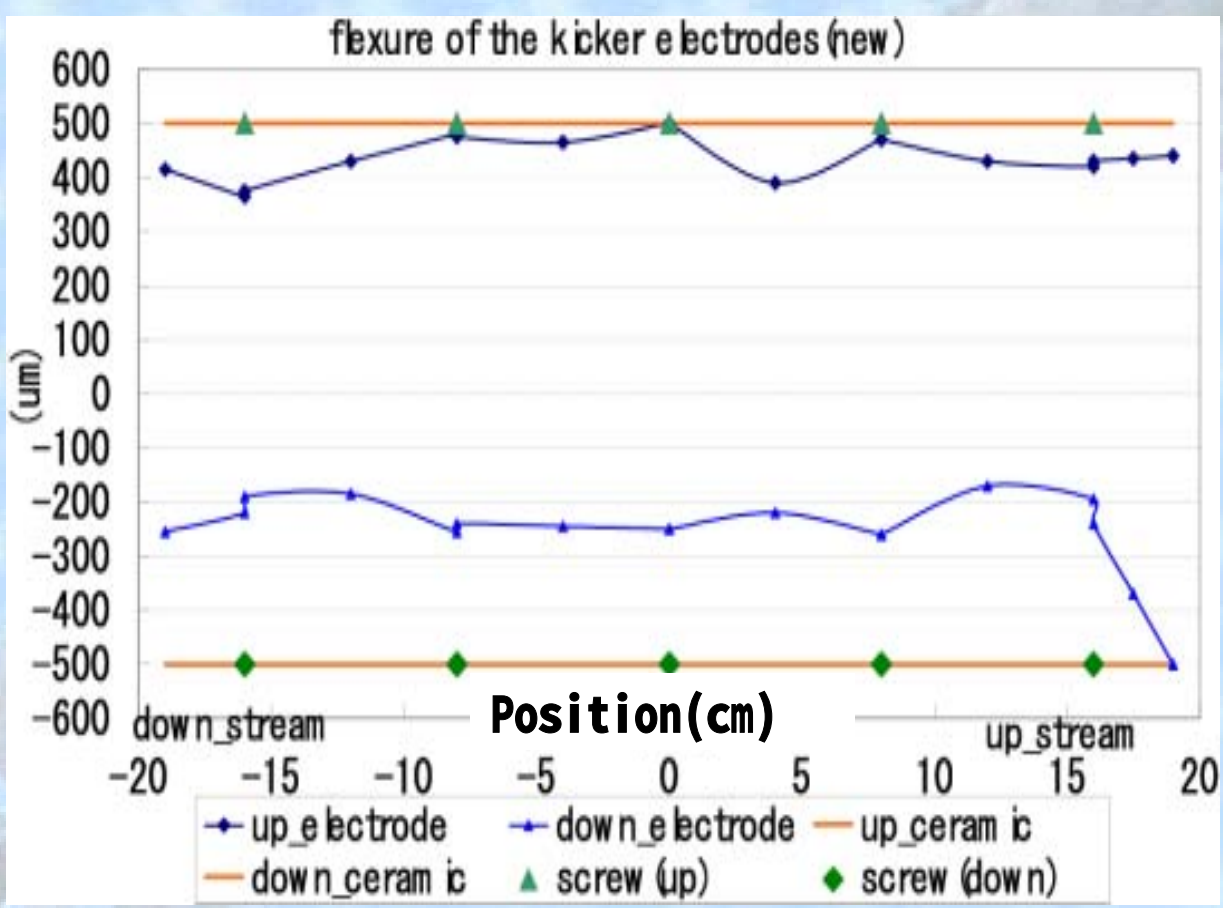
<kicker's characteristic 1> Tilt of the electrodes



Under 30 um at 1mm gap

<kicker's characteristic 2>

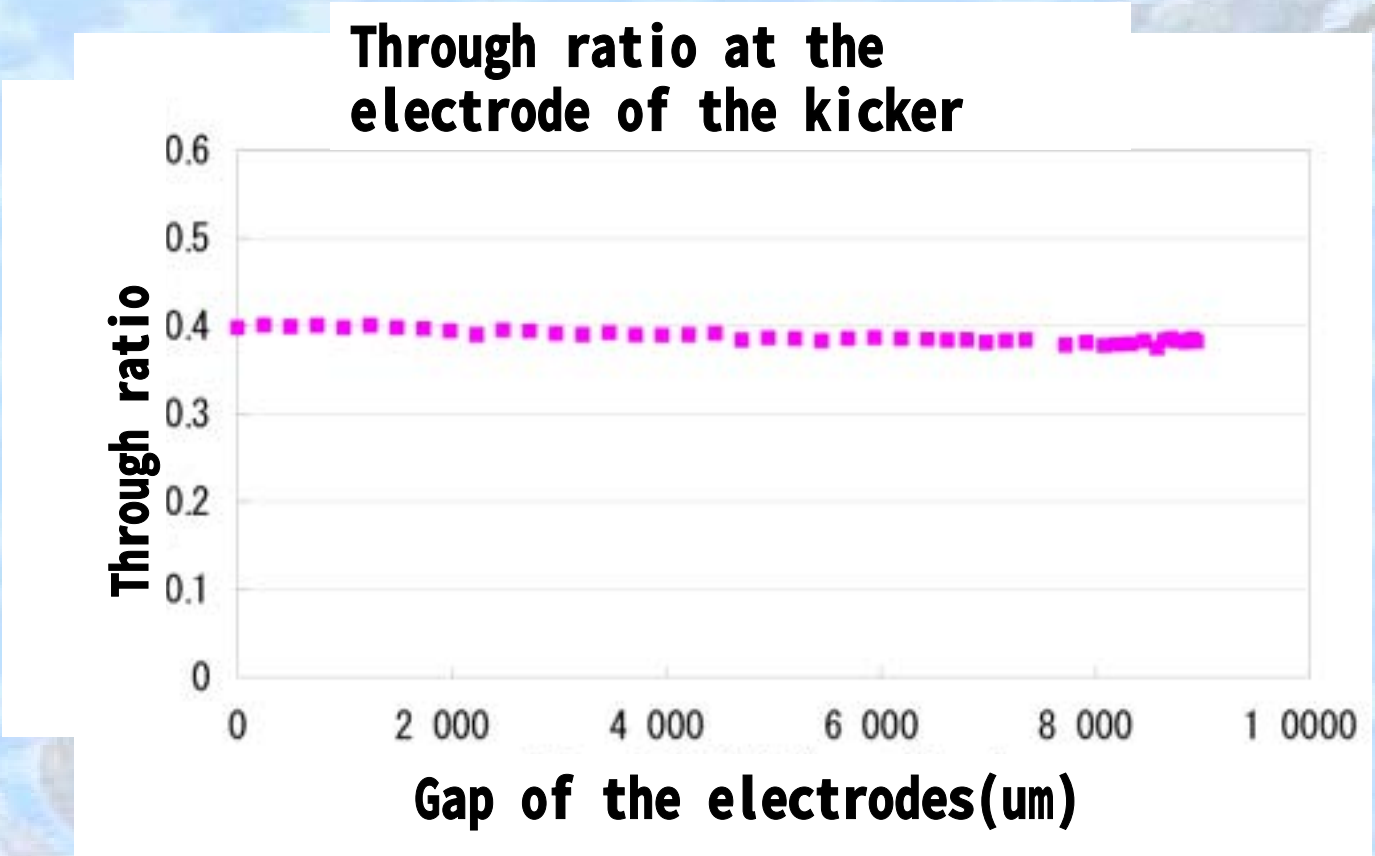
Flexure of the electrodes of the kicker



Flexure of the electrode is less than 125μm

<kicker's characteristic 3>

Signal intensity's loss at the electrode of the kicker

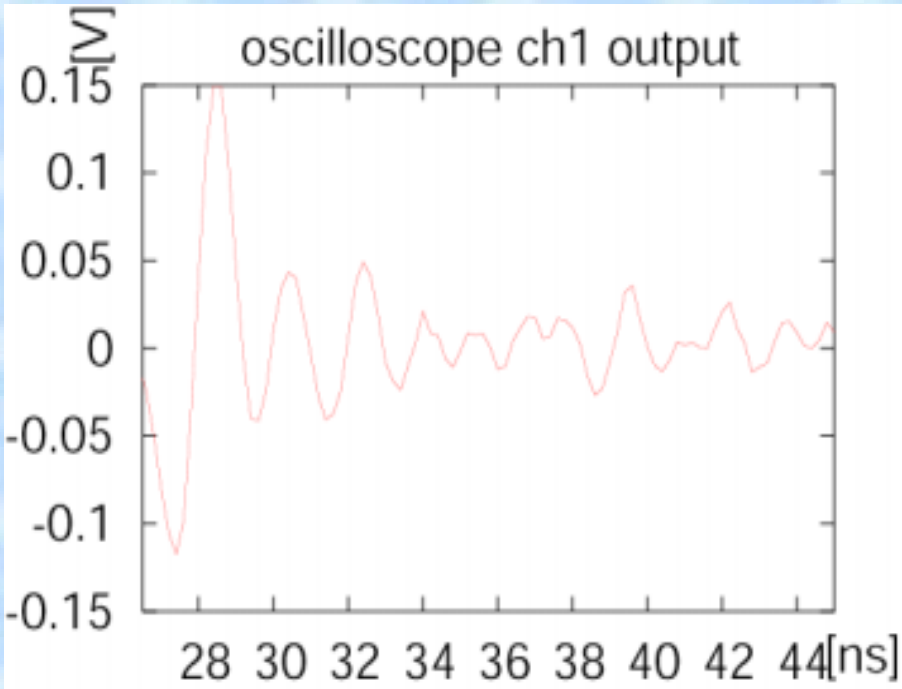


Loss at the electrode of the kicker is not change if we change the gap of the electrode, so characteristic impedance is not same as we think.

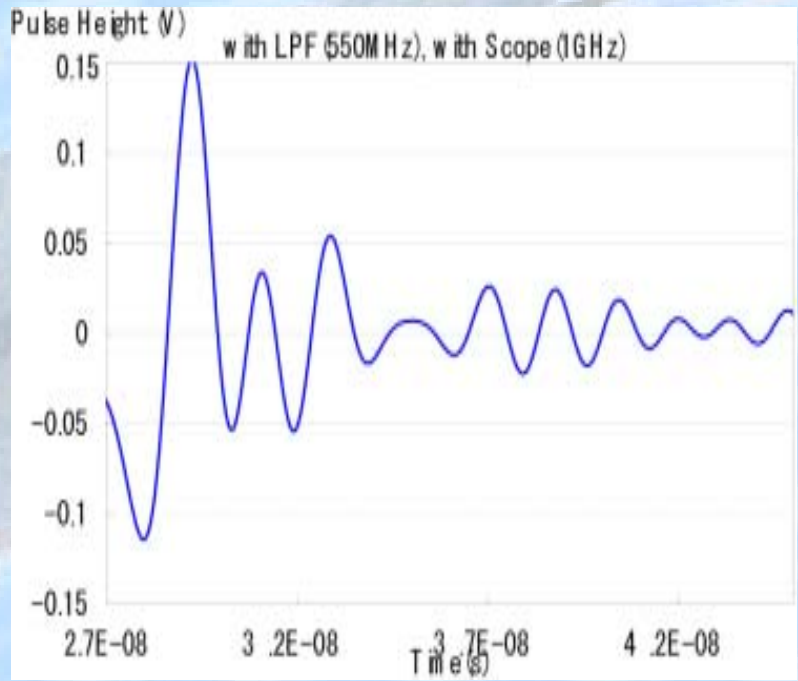
<BPM's characteristic >

FEATHER (羽)

<Pulse shape(comparison with simulation)>

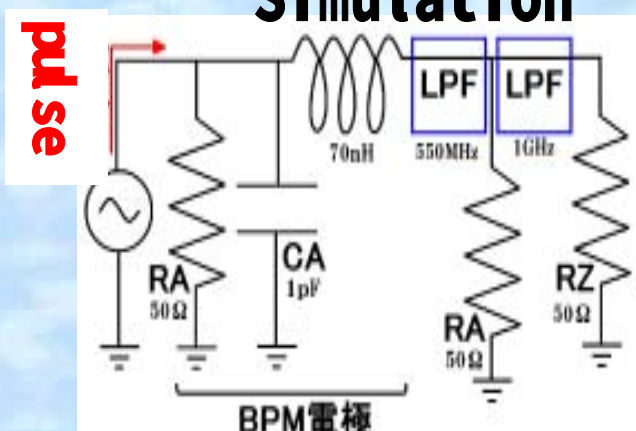


Real

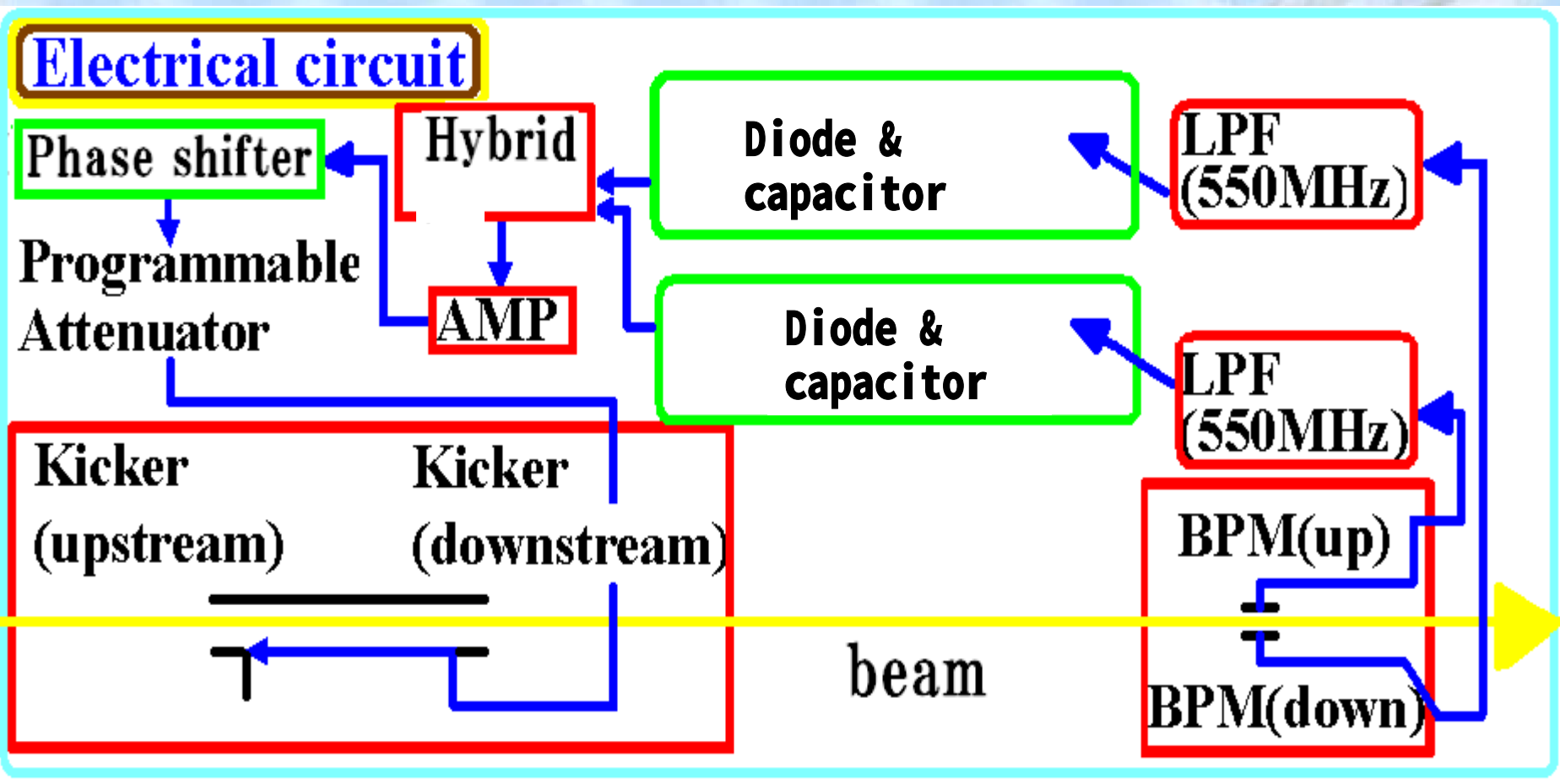


Simulation

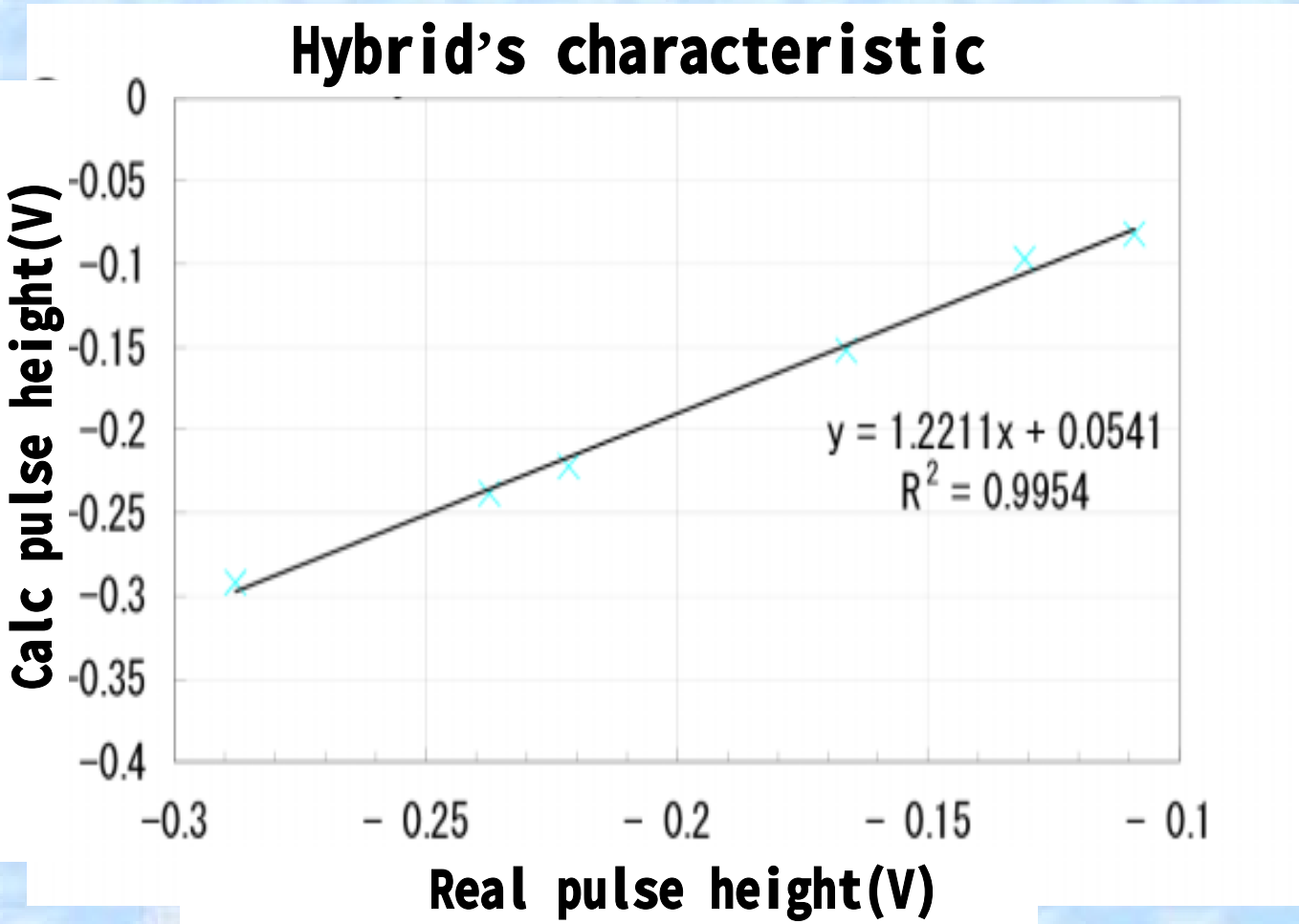
Real looks like the simulation

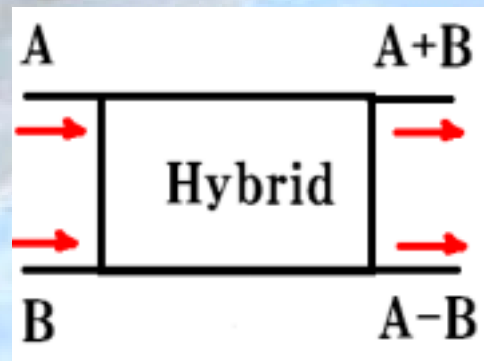


<Feedback circuit>



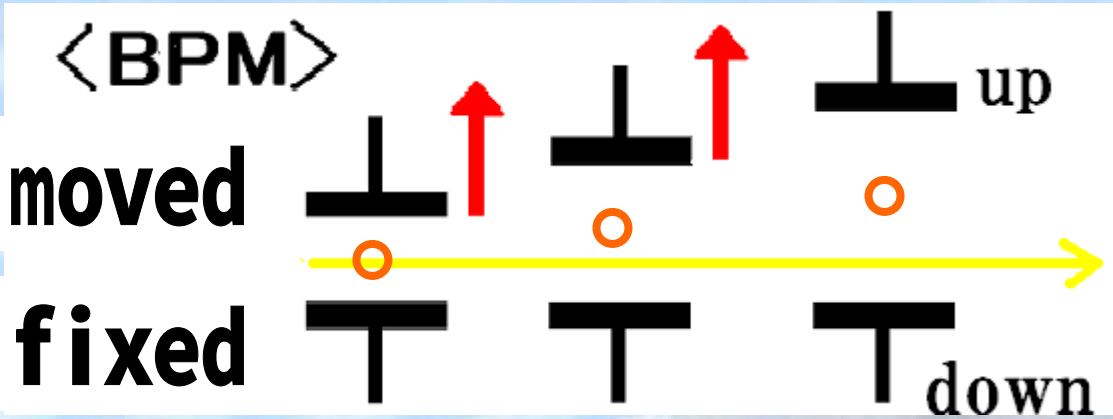
<Hybrid's characteristic>

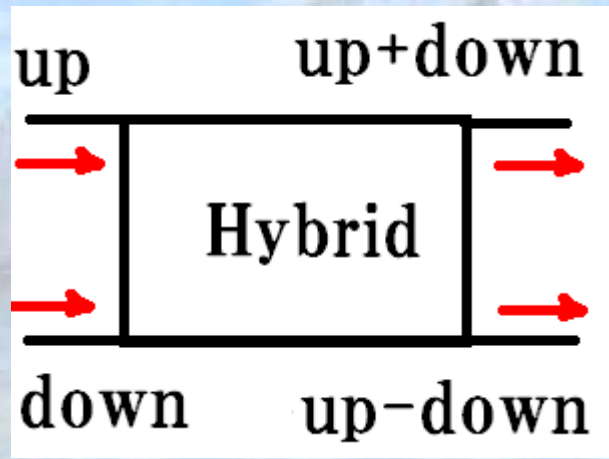


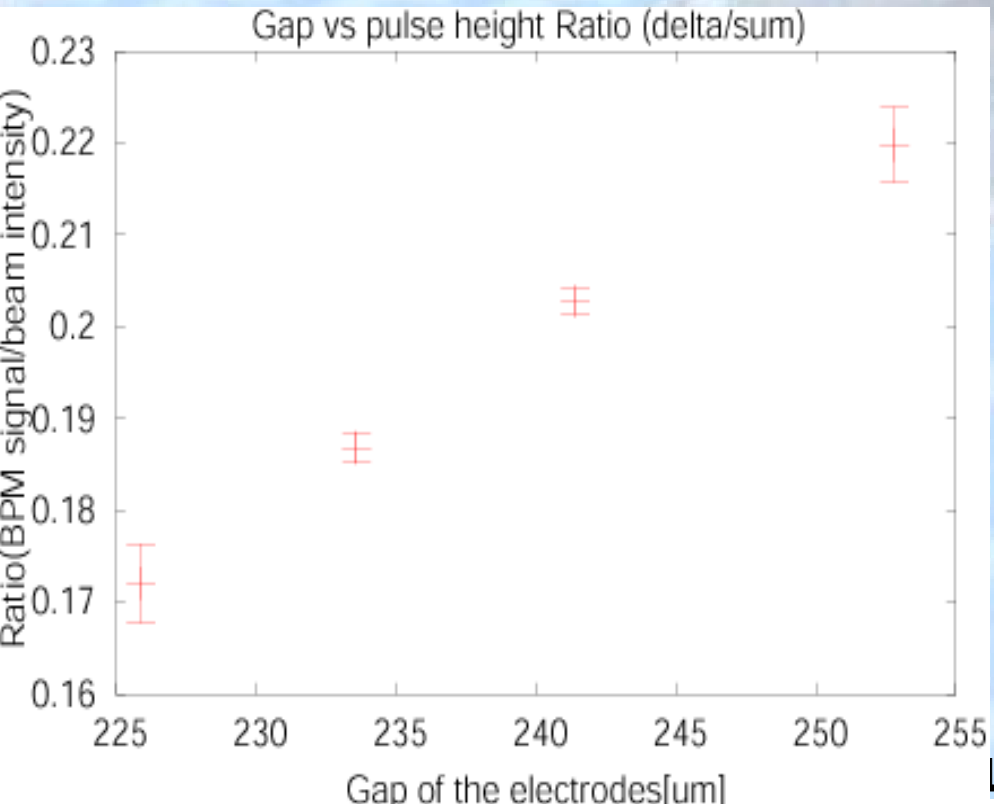


R^2=0.98～1.00 => good line

<BPM calibration>







We must take more data.

<Phase sifter>

We have made movable Phase sifter.

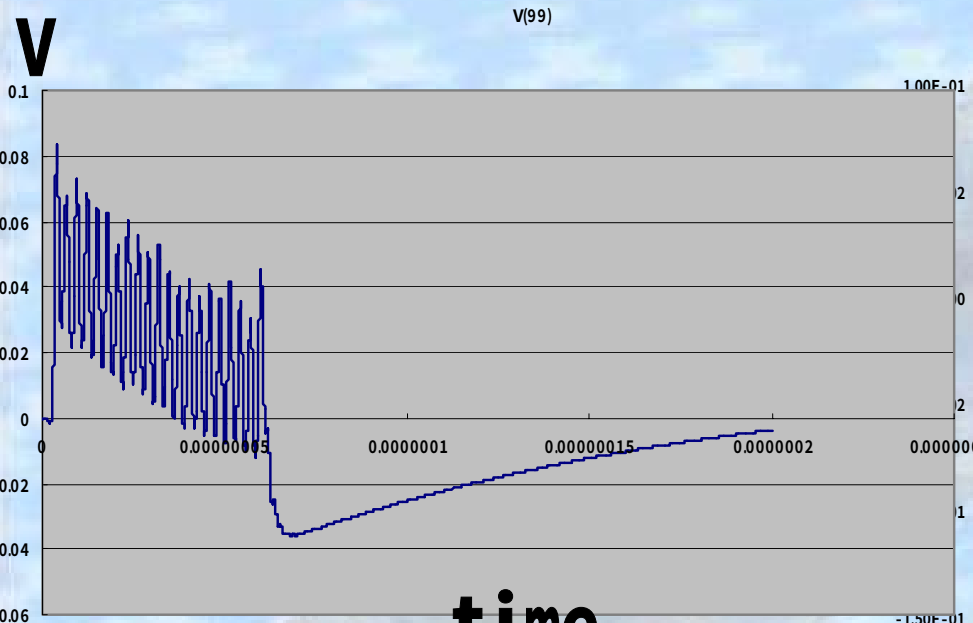
<AMP(1-500MHz)>

We have chosen wide band AMP.

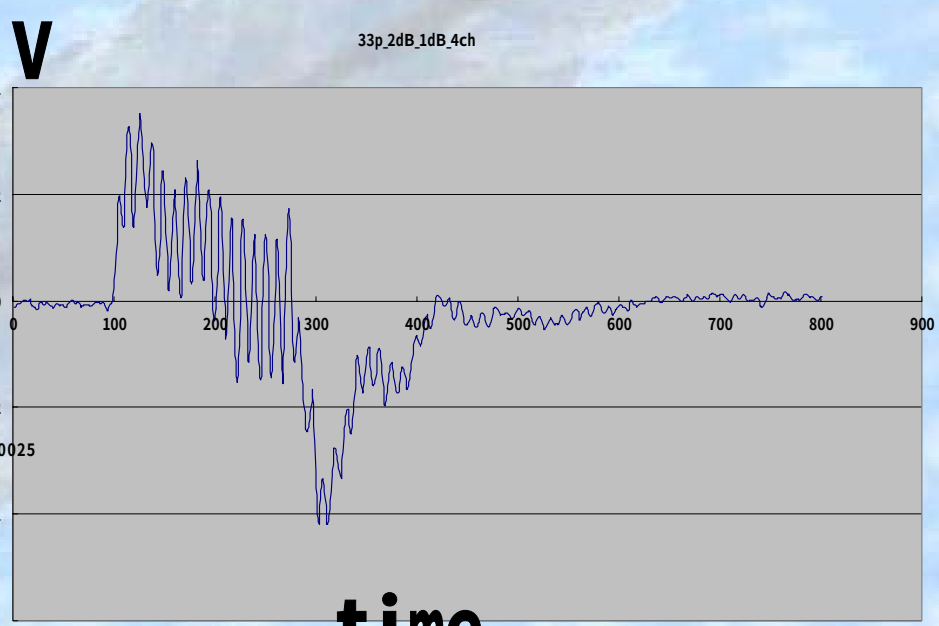
<Diode>

We have made the commutator with the diode using the SPICE simulation.

<Simulation of all circuit>



simulation



Signal generator & circuit

<Next beam test>

Next week, we want to do feedback at ATF!

<Conclusion>

- The kicker have tile less than 100μm.
- Pulse from SPICE simulation looks like real BPM pulse.
- Hybrid have good linearity.
- Feather's BPM have 8.3μm accuracy. This is better than ATF's BPM. (ATF's BPM:20μm accuracy)
- We could get components what we need to make feedback loop.
- Feedback pulse have known by the SPICE simulation.

So, we know how much strong kick we get. (kick:20μm)

We will see the feedback at next week! (We hope.)