

FEATHER

FEATHER (羽)



FEedback AT High Energy Requirements

Progress report

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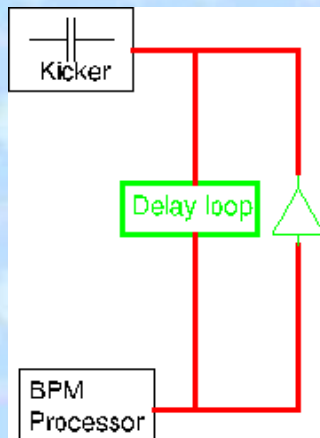
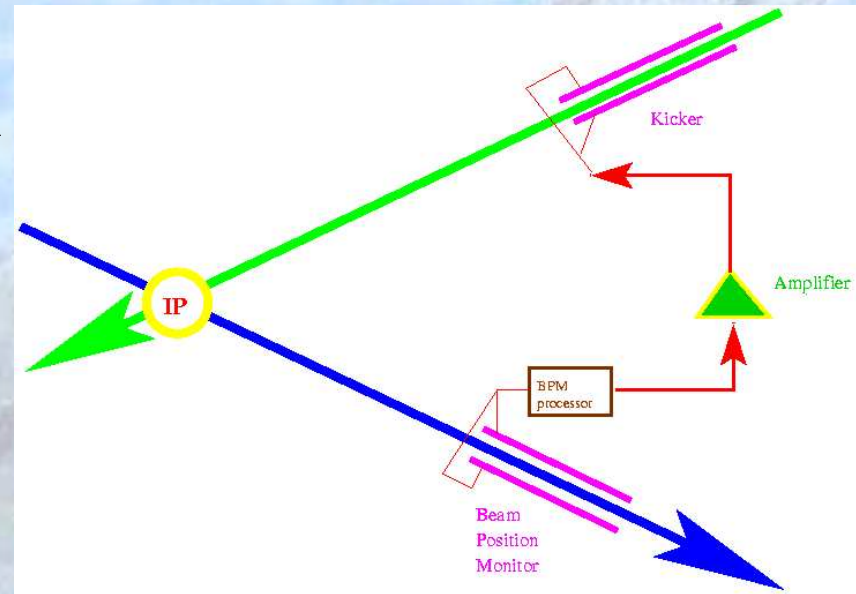
- Models overview
- Movable Kicker and BPM
- Experimental setup
- Beam tests
- Future plans

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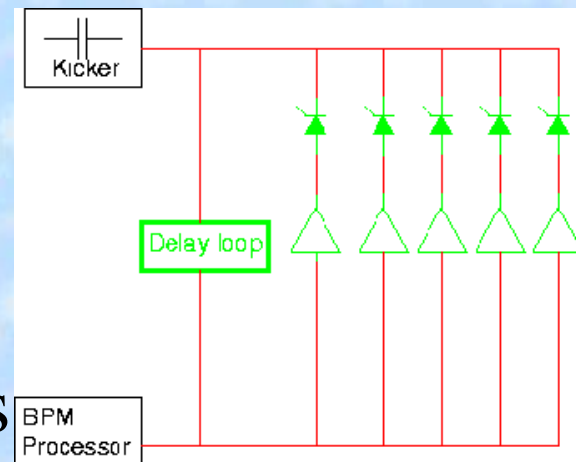
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The fast feedback models

Simple model:
simple direct feedback



Delayed model:
feedback with a delay loop



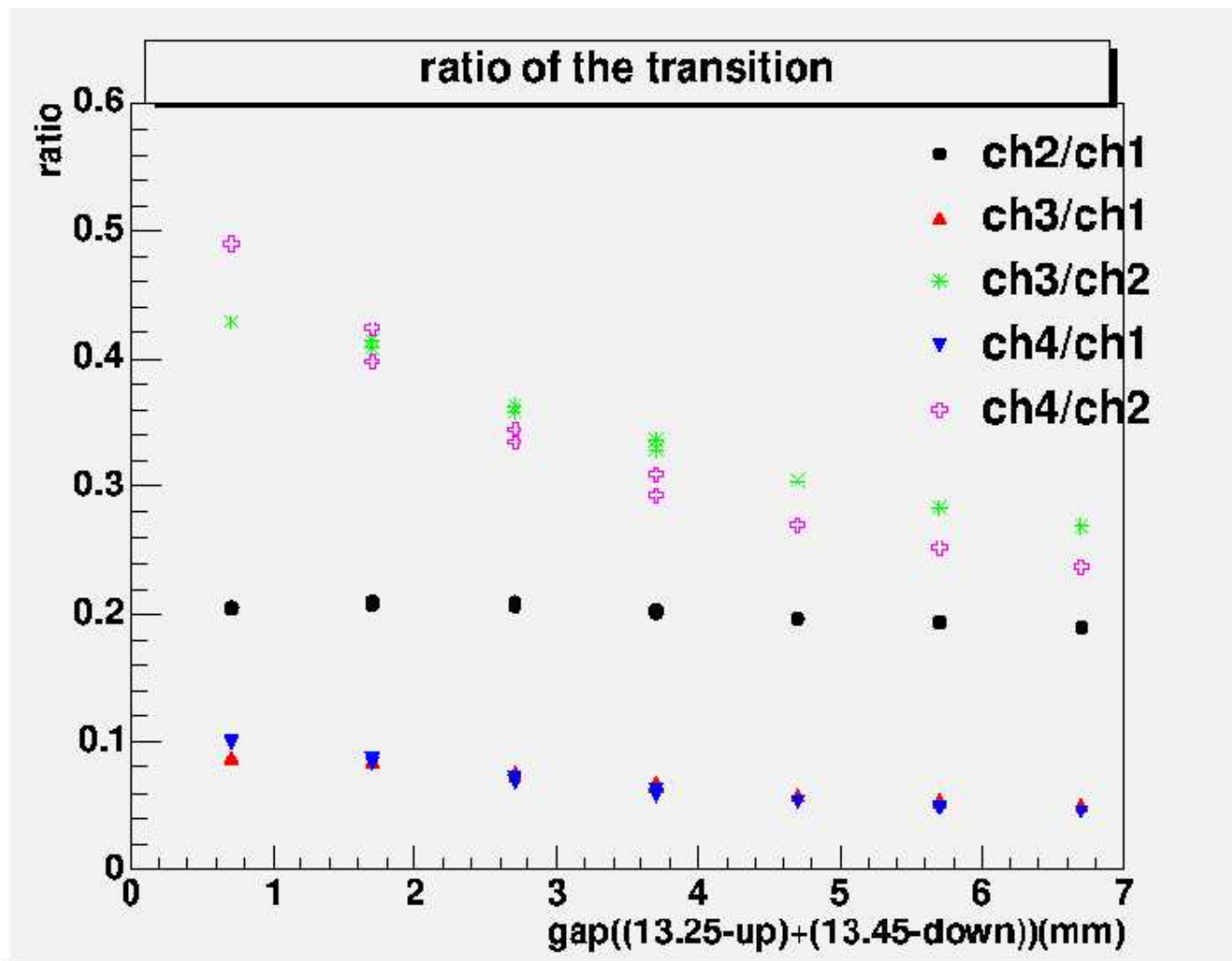
Improved model: delayed model
+ diodes to switch between different gains

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New beam components

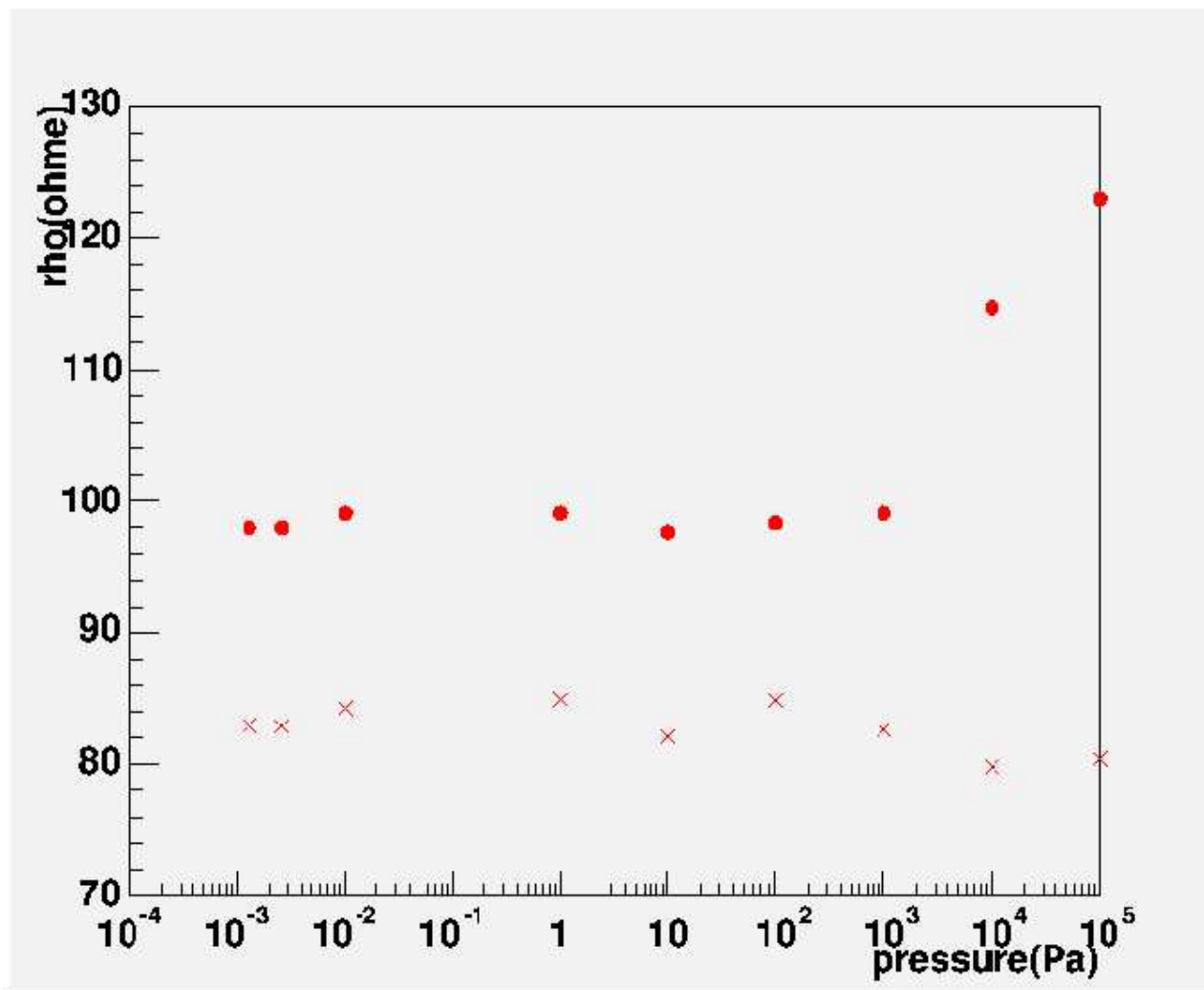
- Movable electrode kicker and BPM have been built
- Electrode position measurement have been done
- They have been inserted in the extraction line
- Impedance measurement was done.
- Electrode moved when air was pumped
=> position & impedance measurement repeated
in vacuum conditions

Signal transmission



Impedance during pumping

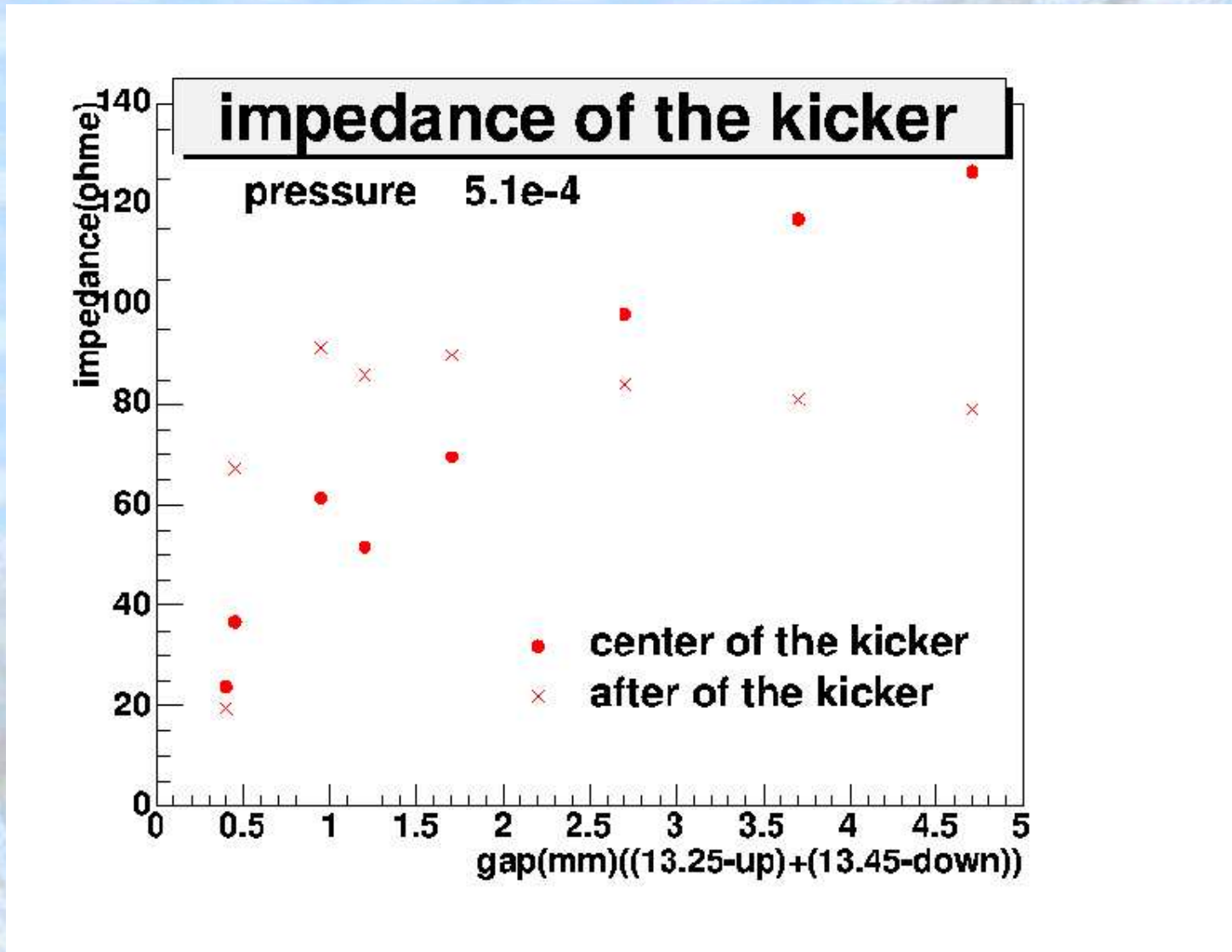
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Impedance vs gap

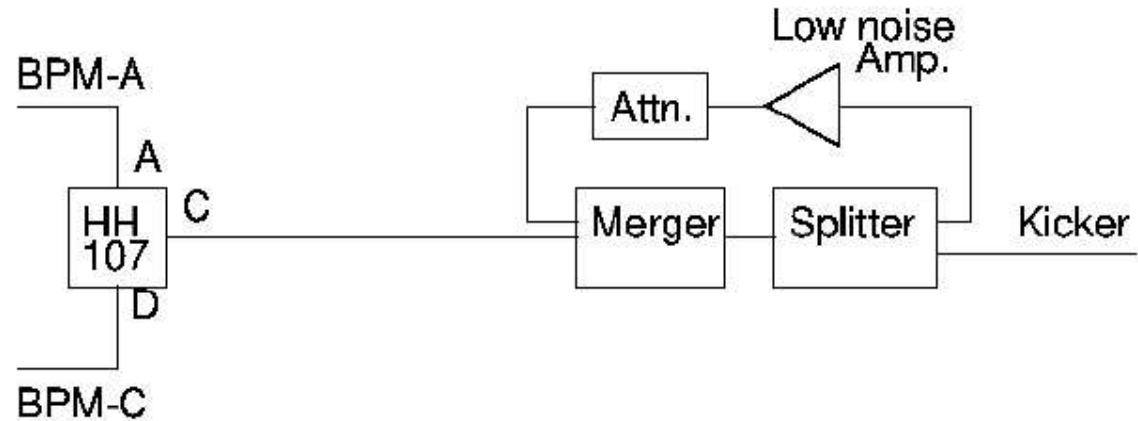


Extraction line layout



- Feedforward and feedback are possible
- Feedforward uses a cavity BPM + kicker
- Feedback uses the new button BPM + kicker

Time budget

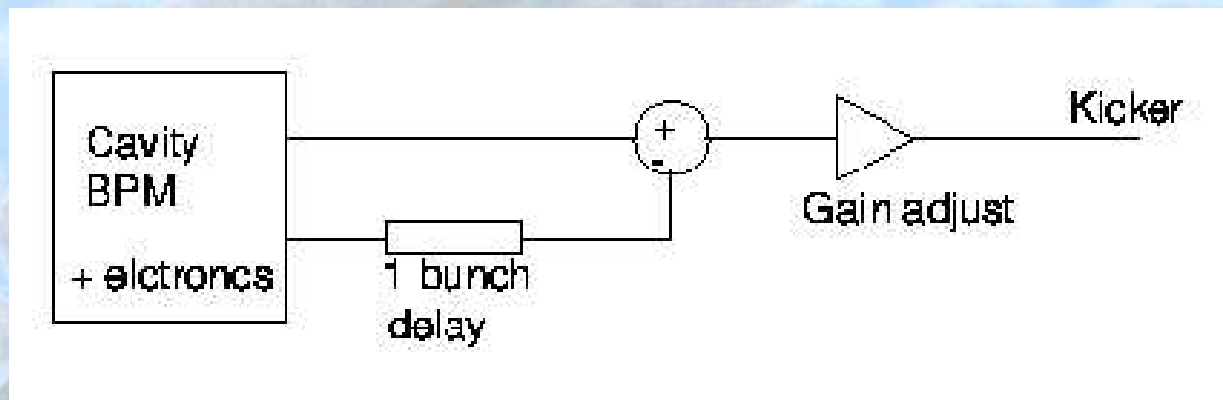


- The response time of our new amplifier has been measured: 5.6 ns
- There is ~1 meter between our kicker and our BPM
 - = > Beam flight ~ 4 ns
 - = > Cable delay ~ 7 ns
- Various electronics delay should be less than 5ns
- Response should come ~20ns after first bunch
- Delay loop needs ~11ns more (Total ~35 ns)
- 20 bunches at 2.8 ns make a 56ns train
 - = > Should be possible to test our delayed model

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FEATHER + Cavity BPM

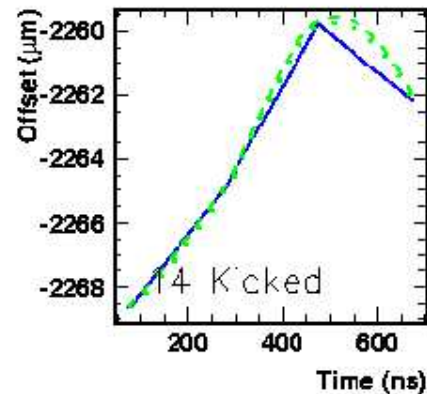
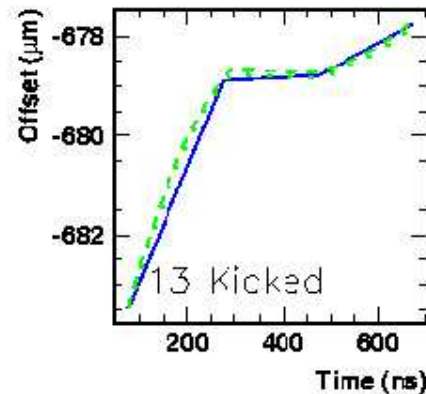
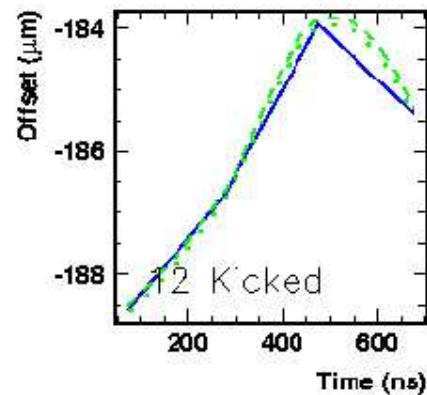
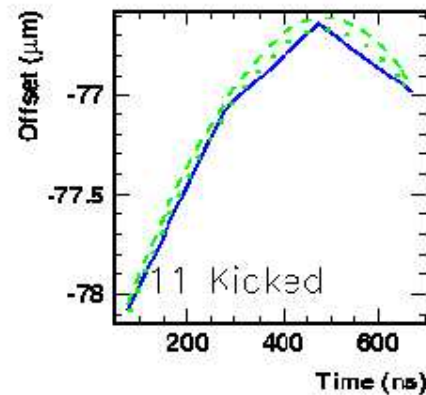
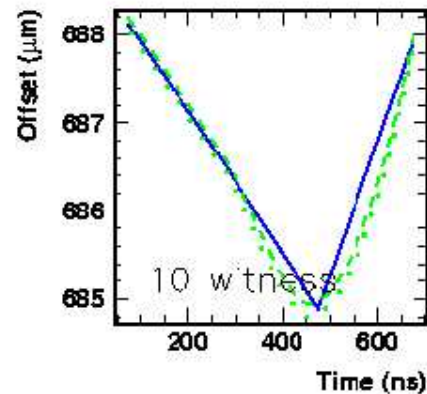
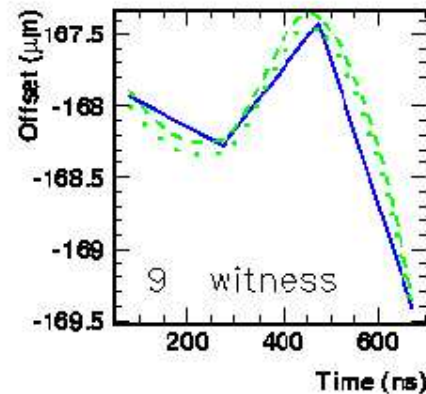
Cavity BPM's output with low-pass filter & diode
has been measured
=> possible to get quick response to feed into the
kicker



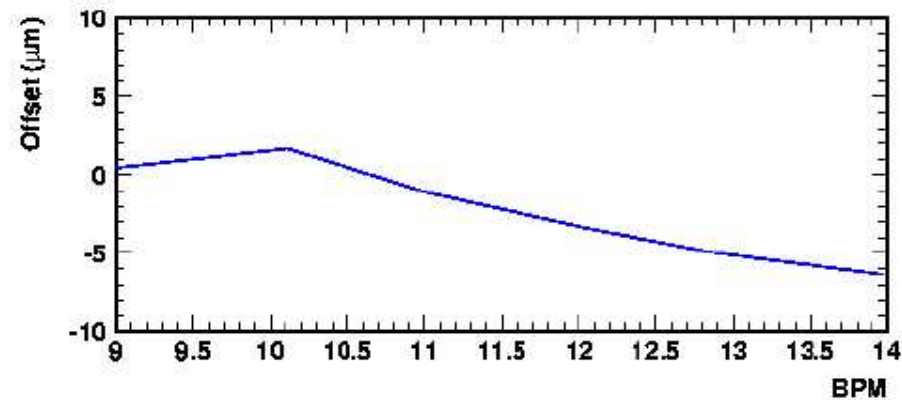
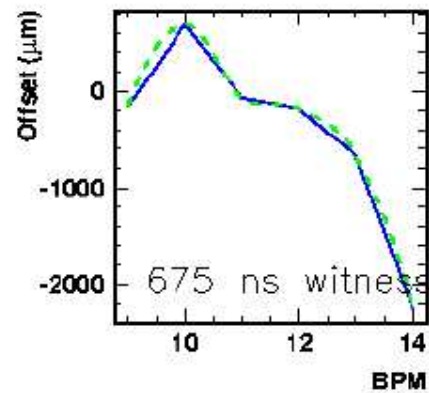
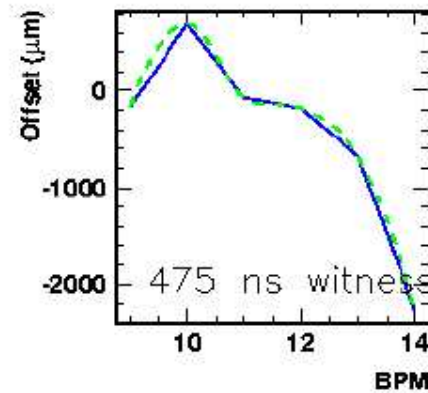
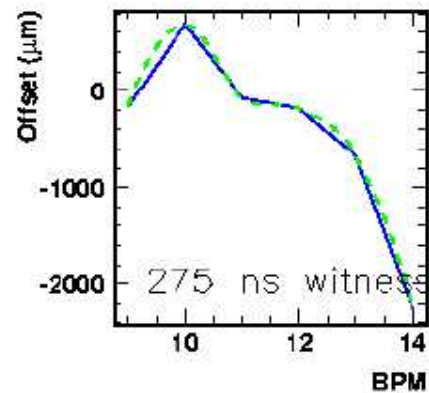
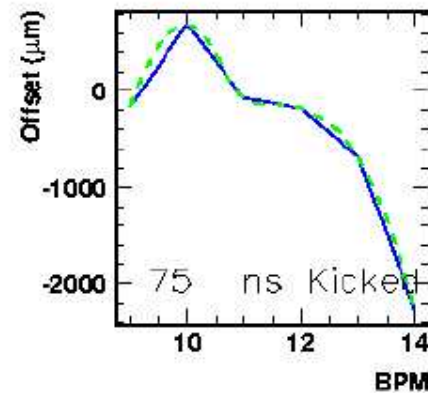
First beam tests

- After the restart of the ATF we had 3 shifts. Our main priority was to test our new amplifier & kicker
- Protocol: Pulse sent to the amplifier and kicker and measured with usual ATF BPM
- Pulse were sent with different timing to reduce the effect of beam fluctuations
- At the beginning we had trouble to get the beam through the kicker but finally we managed to do it with a gap of 2mm and later with a 1.5mm gap

Kick offset VS pulse timing



Beam trajectory for different timing



Future plans

- Try to reach lower gap operation
(1.2 mm? 1mm seems not possible)
- Study magnetic effects in the kicker
(difference between upstream/downstream ports)
- Study phase effect
(kick in phase/ 180° phase shift...)
- Calibrate button BPM & cavity BPM
- Test raw feedback & feedforward
- Full feedback/feedforward

Exciting tests are coming...