

FEATHER

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FEedback AT High Energy Requirements

Progress report

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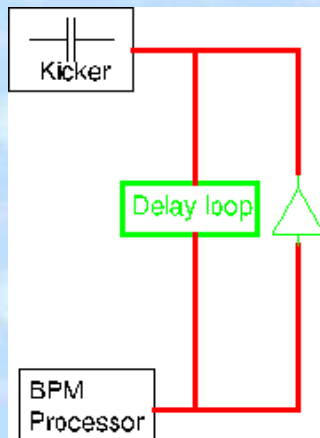
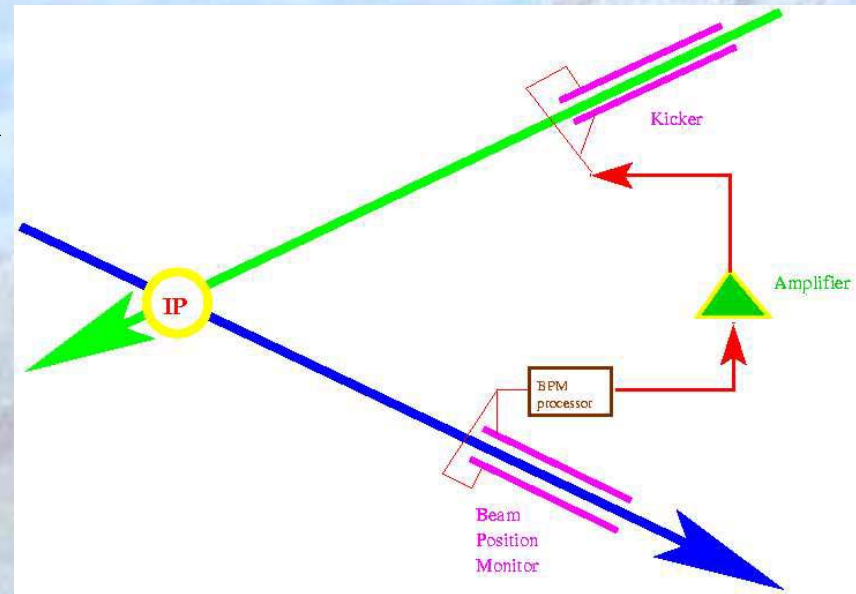
- Models overview
- Movable Kicker and BPM
- Experimental setup
- Beam tests
- Future plans

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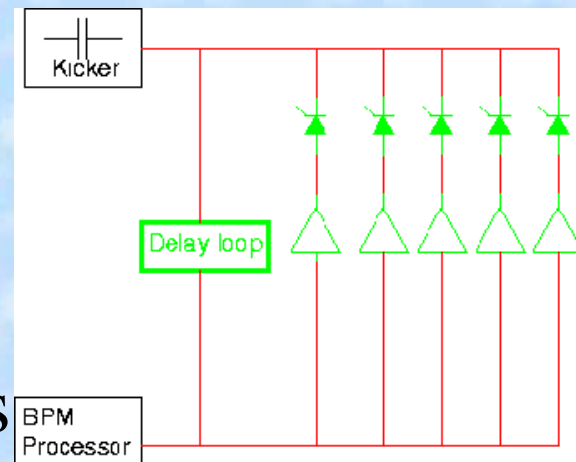
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The fast feedback models

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

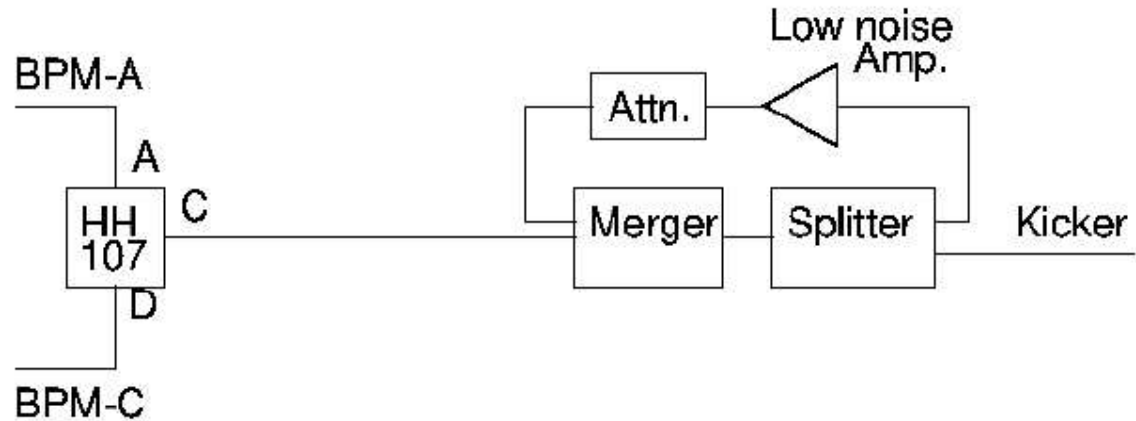
- A Movable electrode kicker and BPM have been built and installed in the extraction line
- They are currently been commissioned
- We faced some unexpected problems when we tried to operate at 500 Mhz
- A new high power (45 dBm) high frequency (500MHz-1GHz) has been bought

Extraction line layout



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

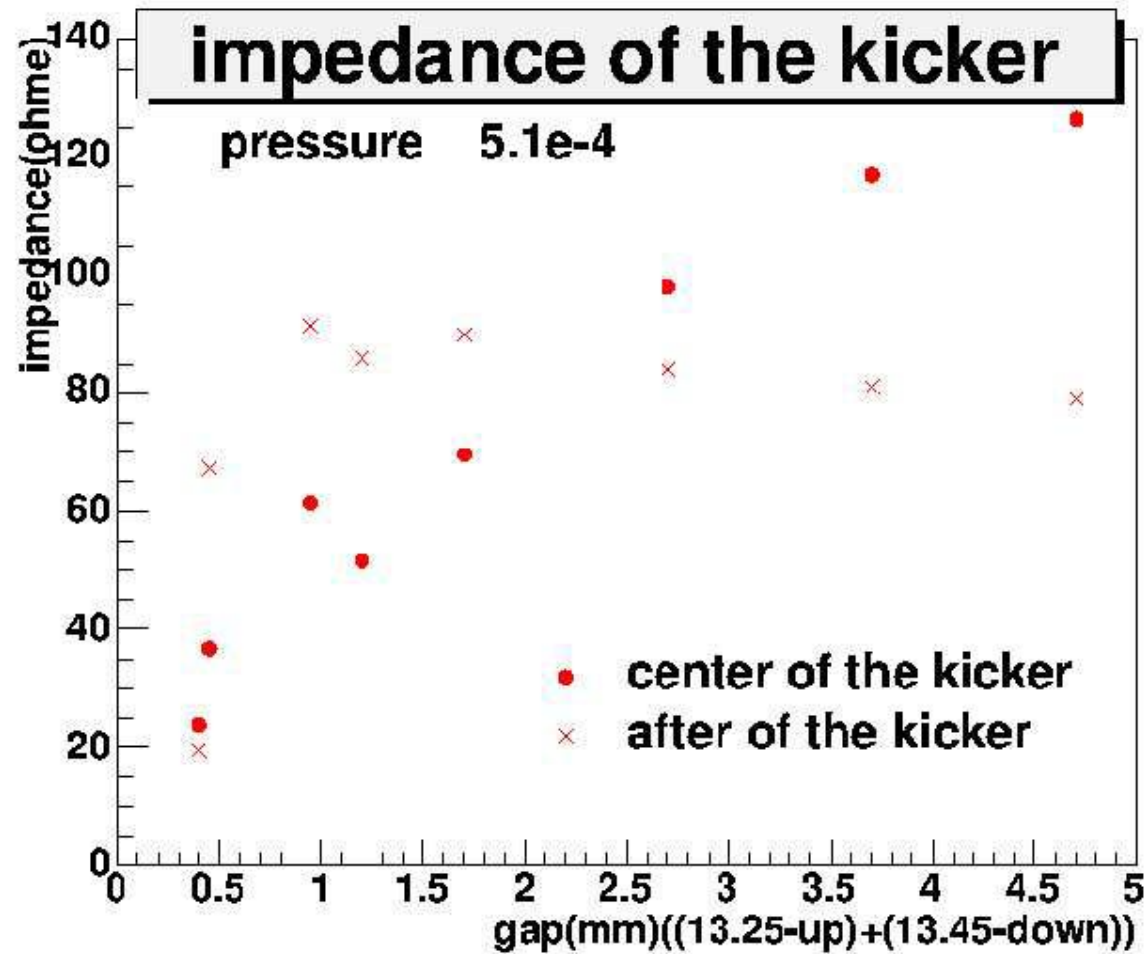
Time budget



- 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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Impedance vs gap

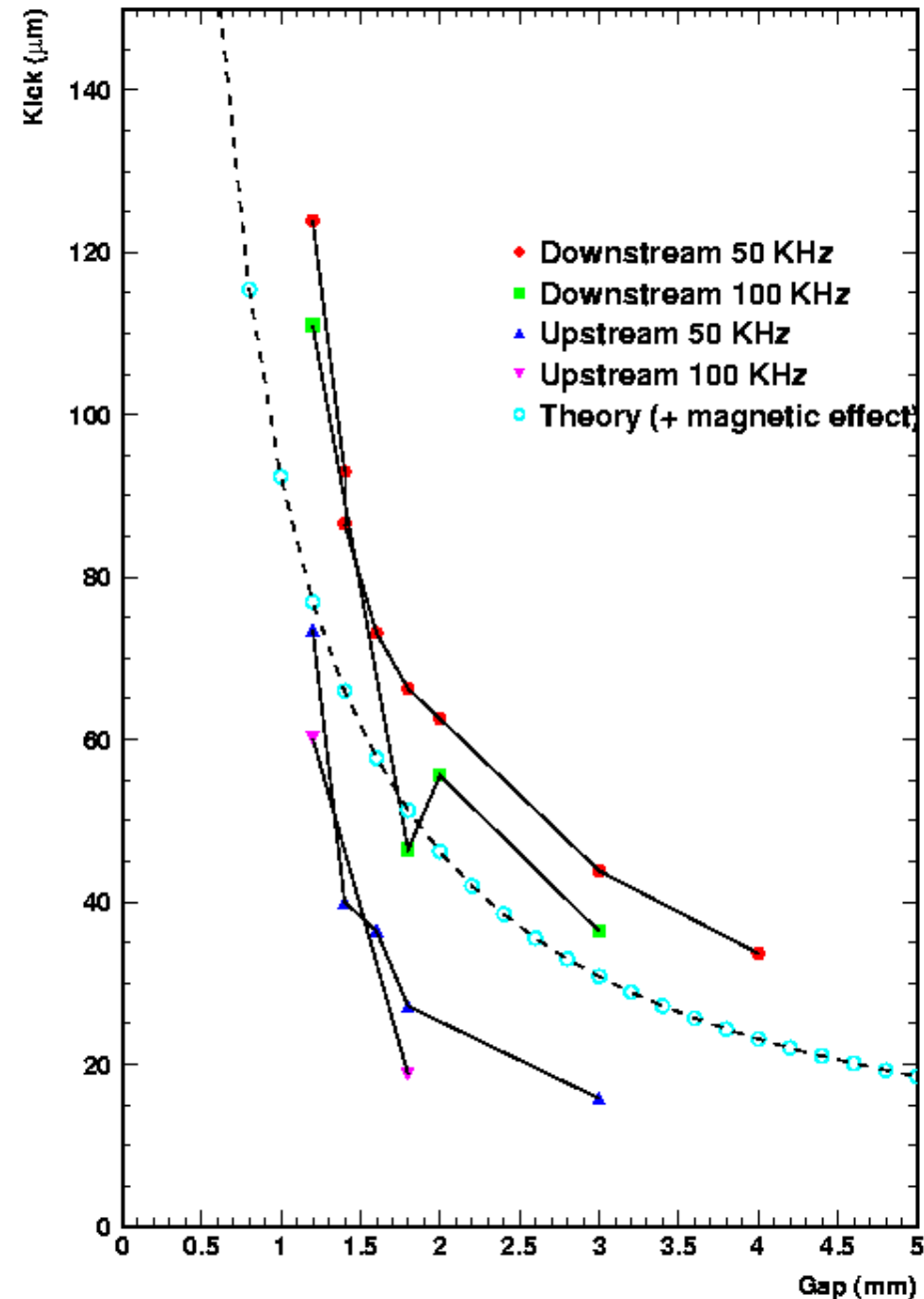


kick vs gap (low frequency)

Kick intensity as a function of the gap for both input upstream and downstream.

Difference between 50kHz and 100kHz may come from the integration method.

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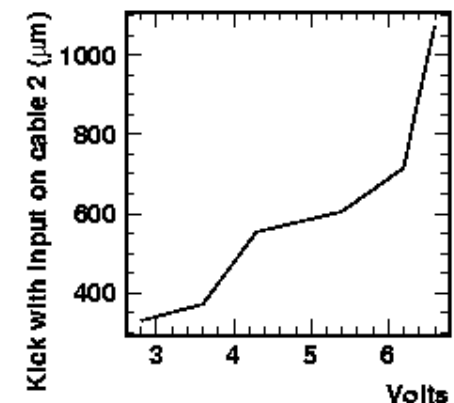
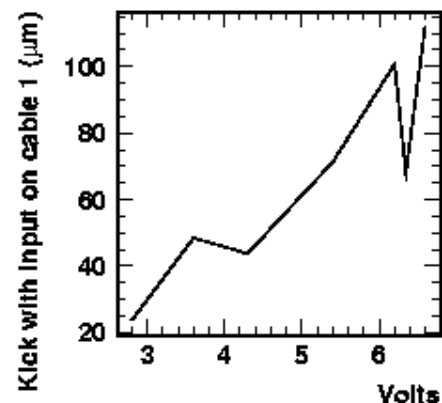
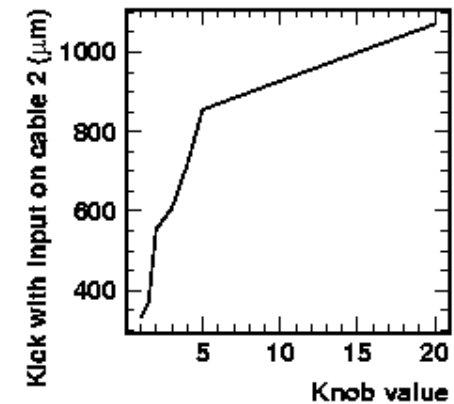
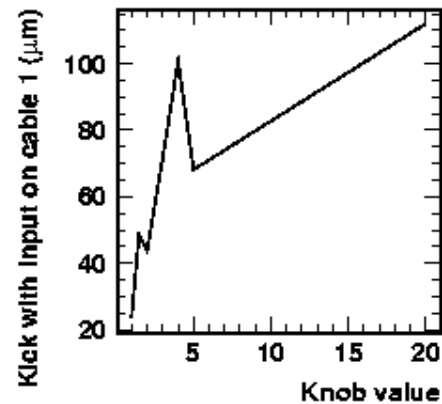
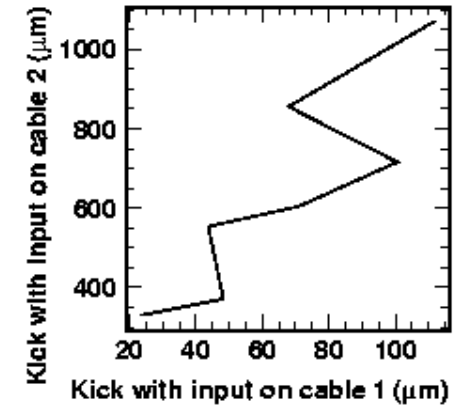
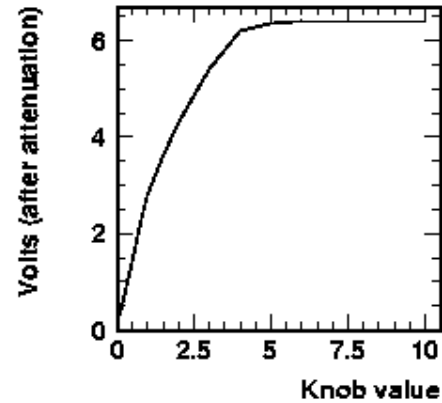
kick vs potential (very high power)

Measurement done with
a 4.5 kVolts pulse
generator

*(values on the plots are
attenuated by 30 dB).*

Sensitivity to the pulse
shape is important for
input downstream not
for input upstream
=> Magnetic effect?

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Upstream

Downstream

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...