# Linearity test of the active base amplifier

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### Signal pulse from generator

## Amplified signal pulse



full width ~10 ns

# Amplifier Gain (A $_{amp}$ / A $_{HP}$ )



- Relatively stable gain for amplitudes between 0.5 V and 1.6 V
- Non linearity on the level of 10 % below 0.5 V

### Non linearity for different divider current

700 V - 700 μ A 900 V - 900 μ A 1100 V - 1.1 mA



Better linearity at larger divider currents

Discussion

Measured gain verified our beam tests results (if measured the gain correctly . . . )

FCAL:

- An amplifier will be needed for inner FCAL insert layers, though with a relatively small gain between 3 and 6.
- Possible solutions to improve the amplifier:
  - use on-board amplifier, provide additional power to the amplifier (decouple power for divider and amplifier), use one extra cable to each PCB
  - use external amplifiers for modules in inner layers (place inside dark room ?)
  - apply non-linearity corrections for already existing bases

## Discussion

#### CCAL:

Estimated the anode current to be relatively small for PrimEx runs, a few micro amps. We can operate the base without an amplifier (or use an amplifier with a small gain x3).

Note, we can change the ADC voltage range from 2 V to 0.5 V, if really needed

- Performance of the modified divider with the stabilization on last dynodes is good (checked)
- Order dividers for the CCAL with a switchable gain (bypassed / gain of 3)

# Amplifier Gain (A $_{amp}$ / A $_{HP}$ )

Different 'injection' resistor

