

FIRST PROTOTYPE FOR CBM FAST – TRD PASA

DETNI PASA

Siro Buzzetti
and
Hans Kristian Soltveit

CBM FAST-TRD PASA

Hans Kristian Soltveit

OUTLINE

- **Overview of the DETNI PASA (neutron detector)**
 - **Measurement and simulation results**
- **First prototype of the FAST-TRD PASA for the CBM experiment**
- **Outlook and perspectives**

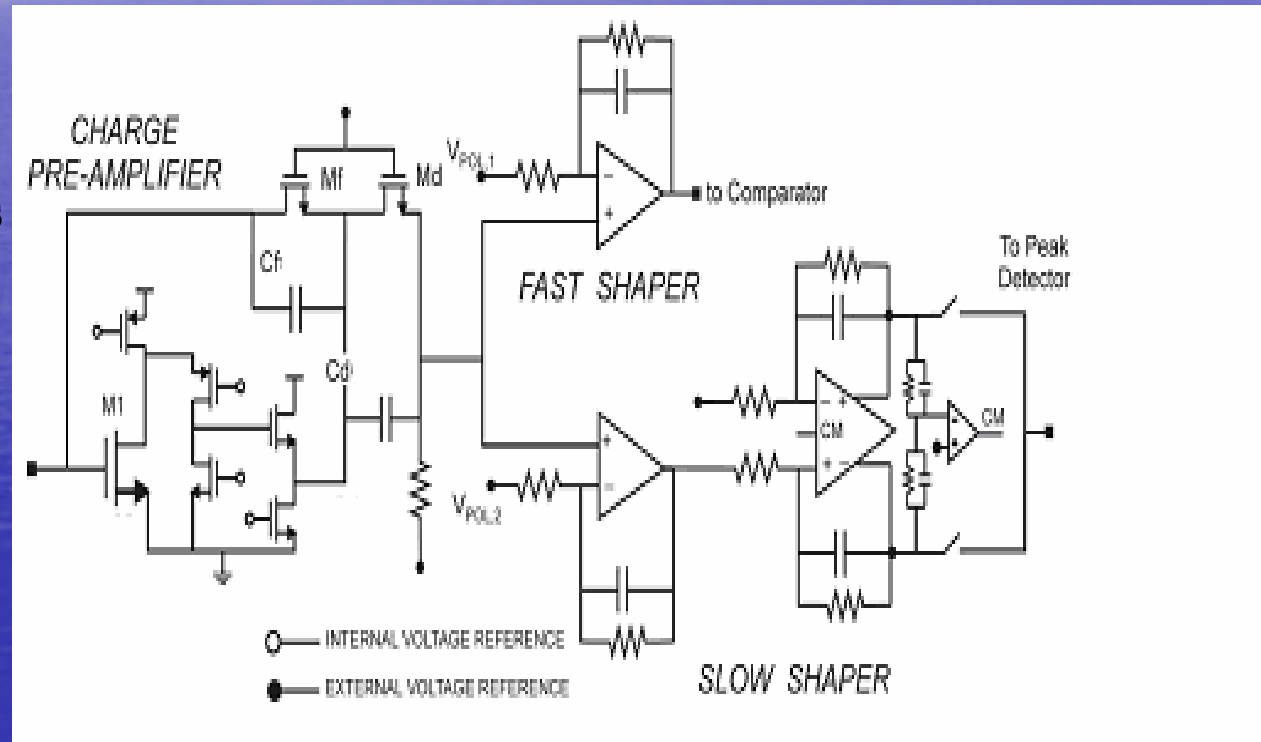
DETNI PASA

**Siro Buzzetti
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DETNI PASA

Main requirements:

- **< 1000e @ 30pF**
- **Peaking time of 30ns/175ns**
- **Return to baseline (650ns)**
- **As low power possible**



DETNI PASA (SLOW CHANNEL)

Slow channel (Energy channel)

Peaking time = 175ns

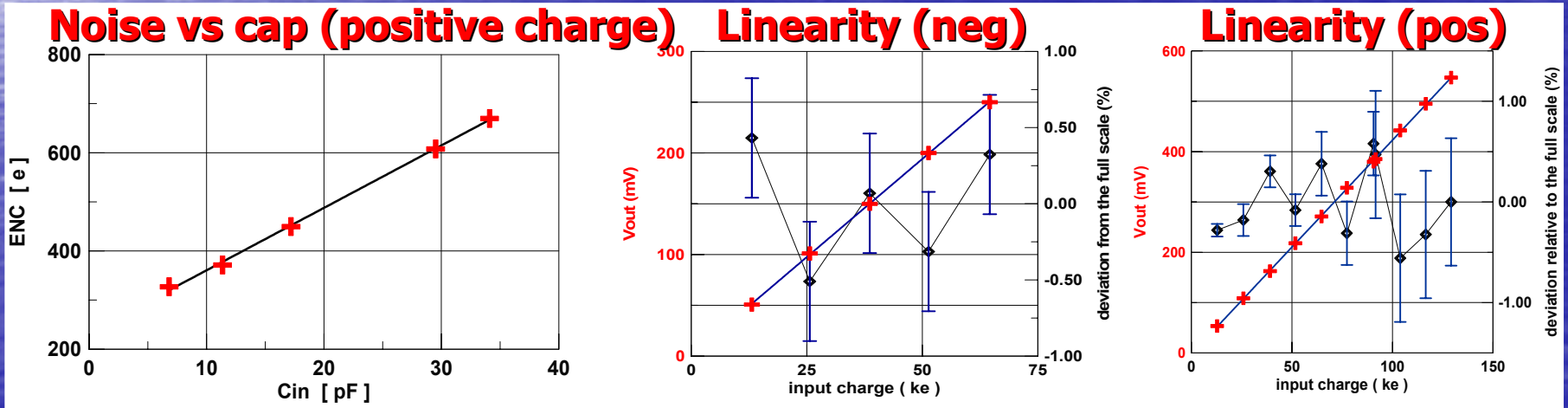
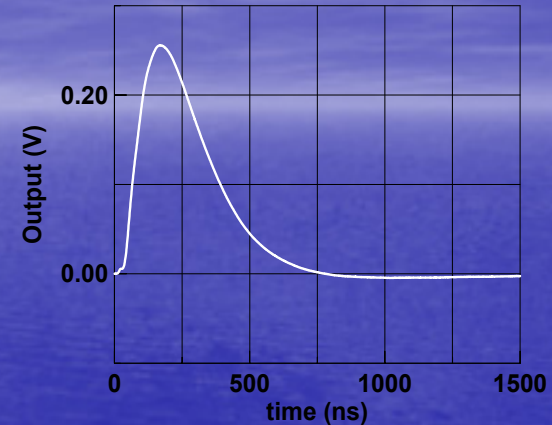
Conversion gain (N) = 26.6mV/fC

Conversion gain (P) = 24.1mV/fC

ENC = 233e + 12.7e/pF

~600e@30pF

~644e@30pF



DETNI PASA (FAST CHANNEL)

Timing Channel

Peaking time = 30ns

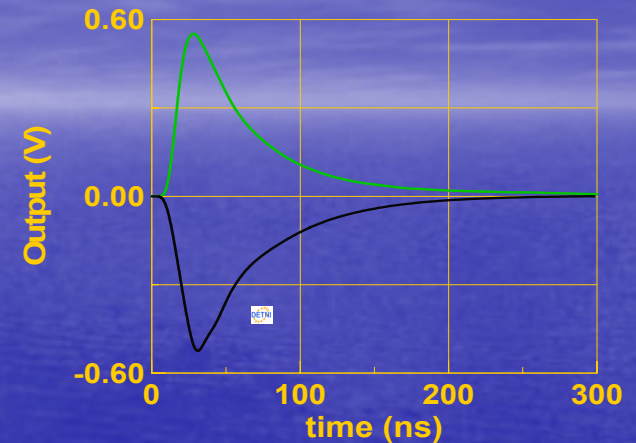
Conversion gain = 57.8mV/fC

Conversion gain = 59.3mV/fC

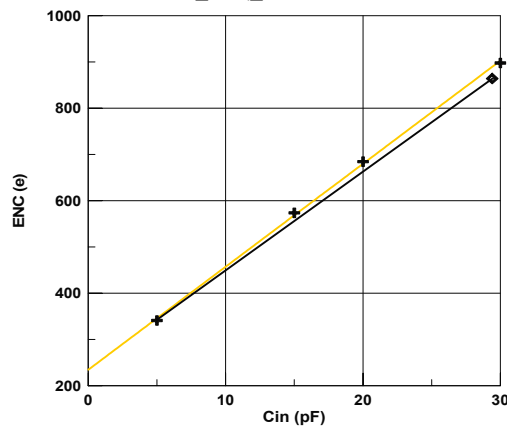
ENC = 200 + 26.9e/pF

~ 980e @ 30pF

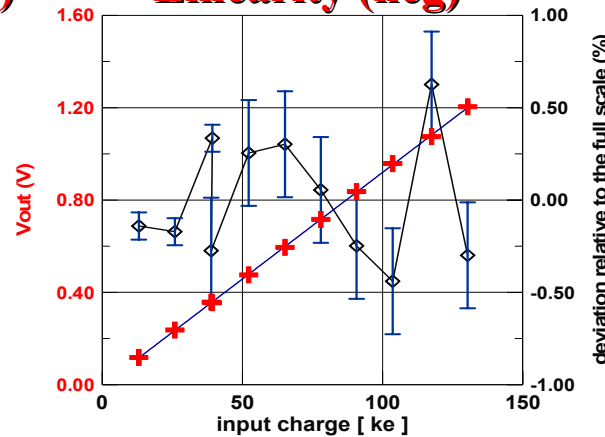
~ 864e @ 30pF



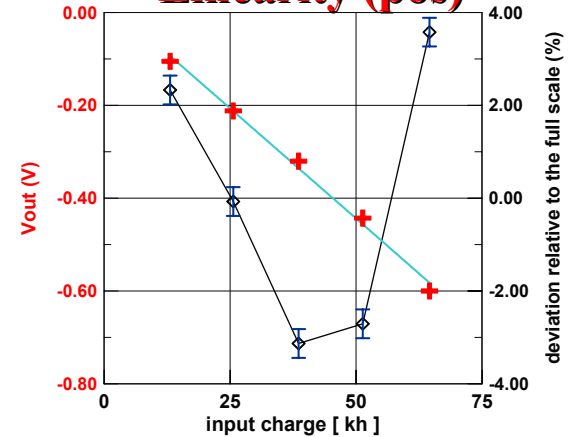
Noise vs cap (positive charge)



Linearity (neg)



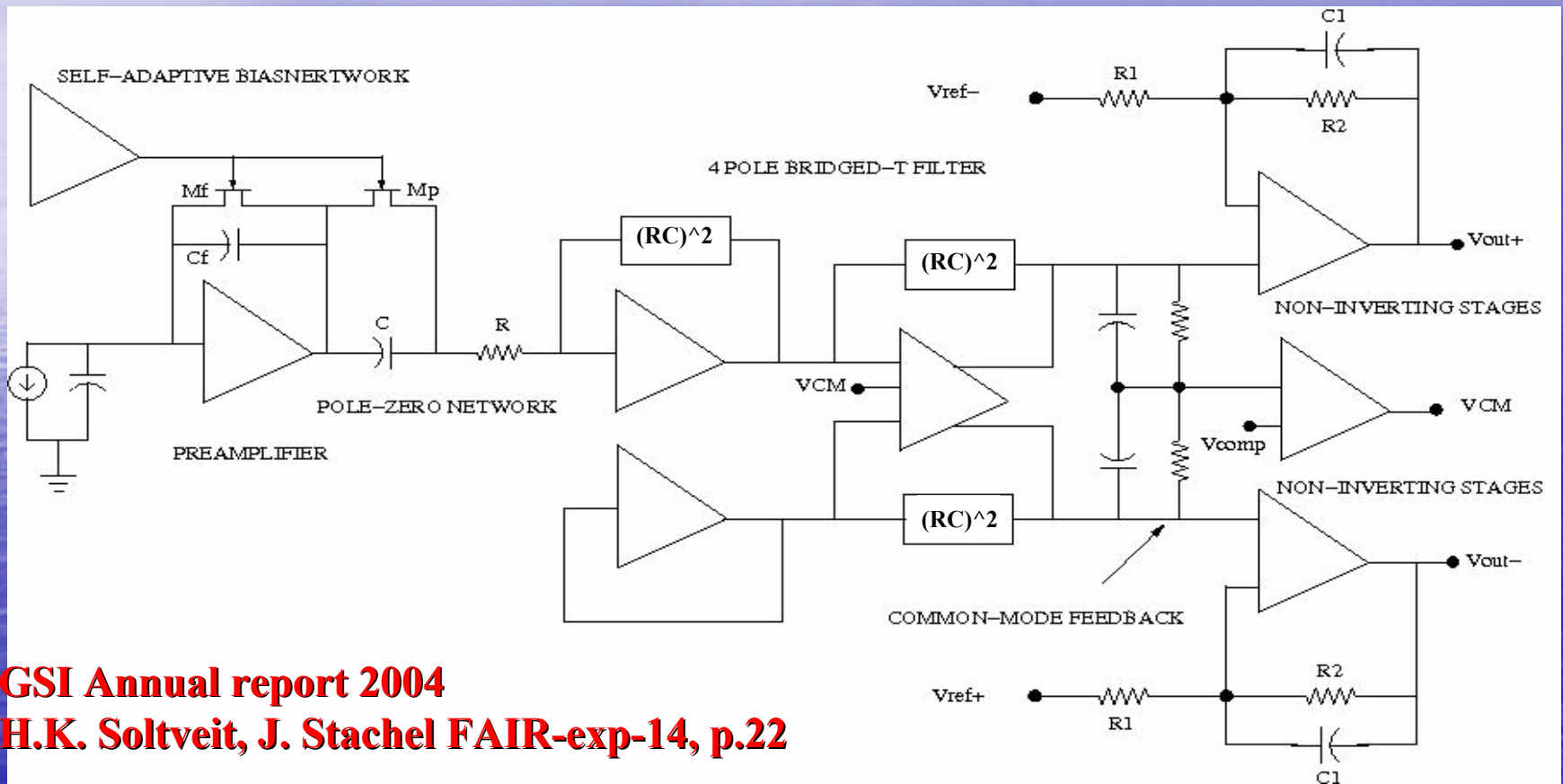
Linearity (pos)



FULLY CUSTOM PASA FOR THE FAST-TRD DETECTOR AT CBM

Hans Kristian Soltveit

PROTOTYPE FOR CBM FAST-TRD PASA



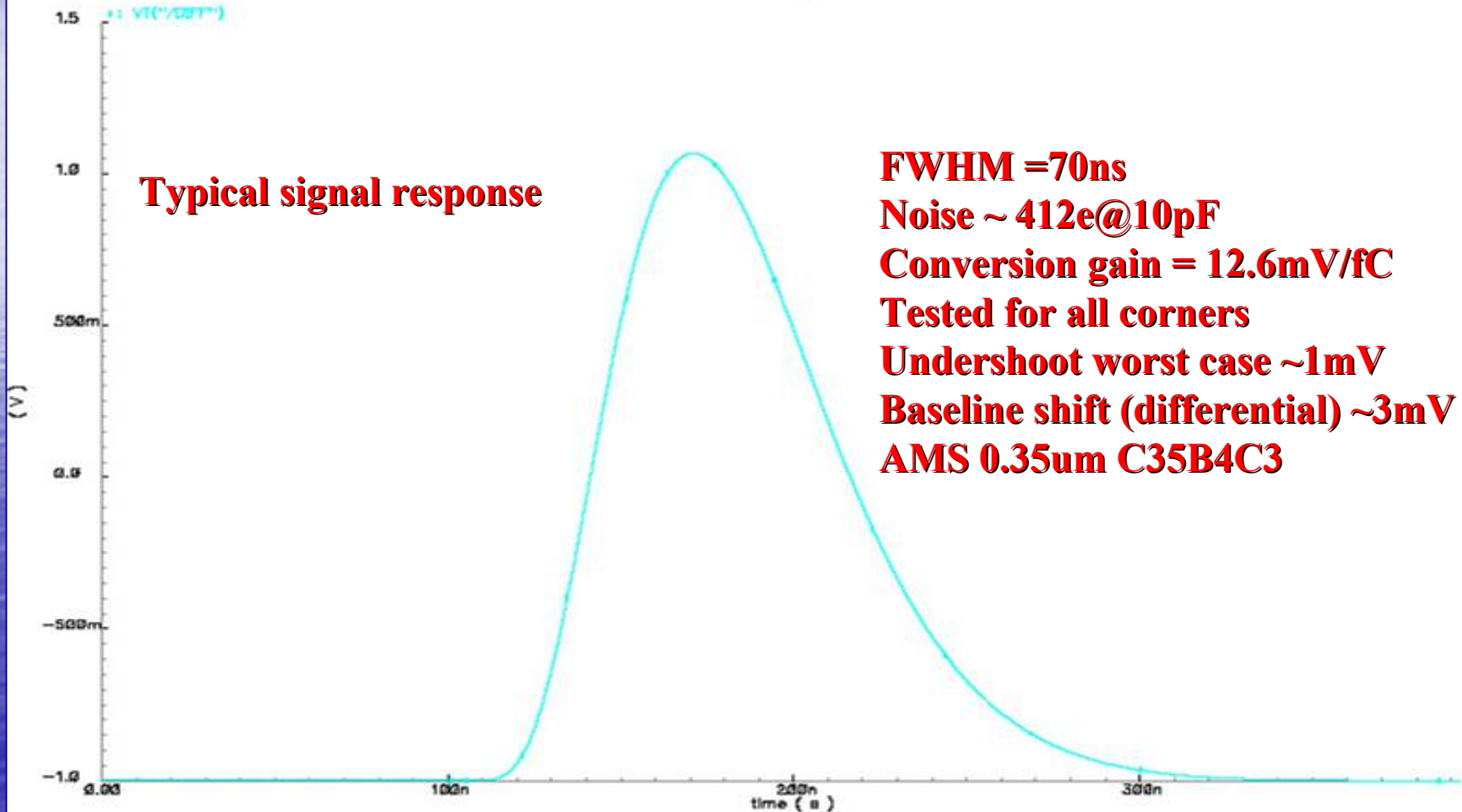
GSI Annual report 2004

H.K. Soltveit, J. Stachel FAIR-exp-14, p.22

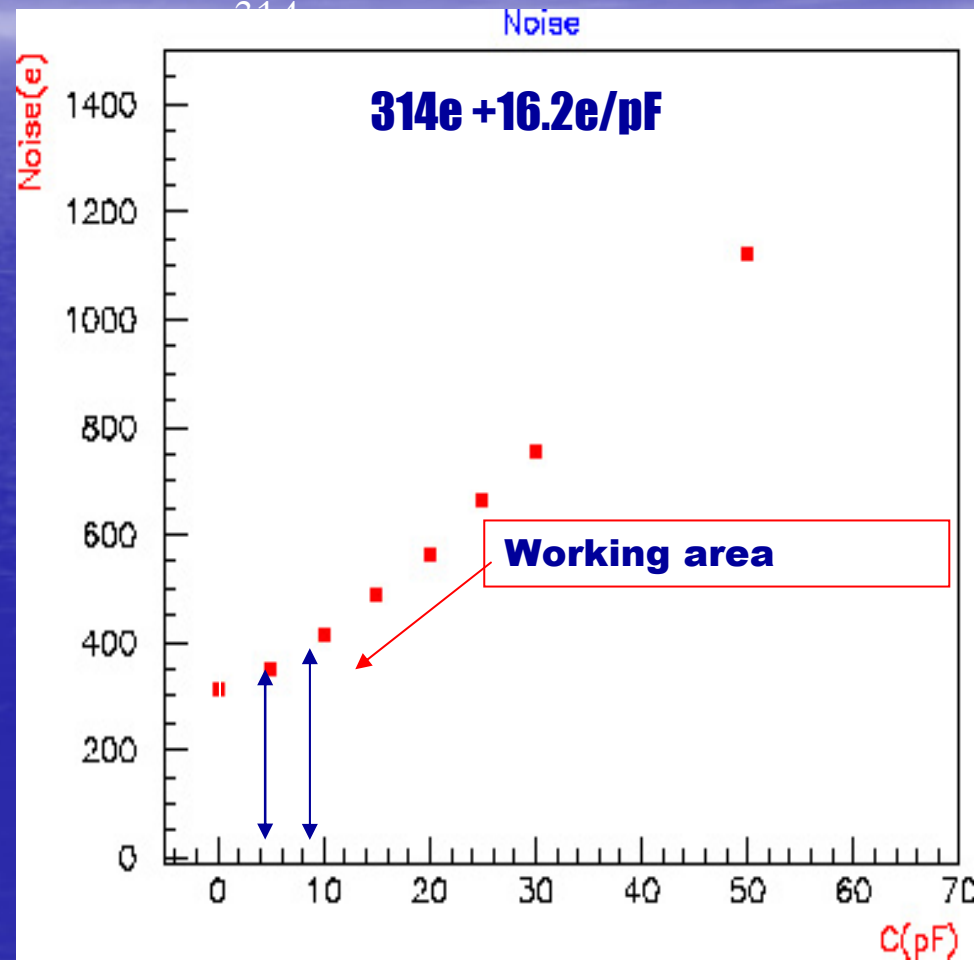
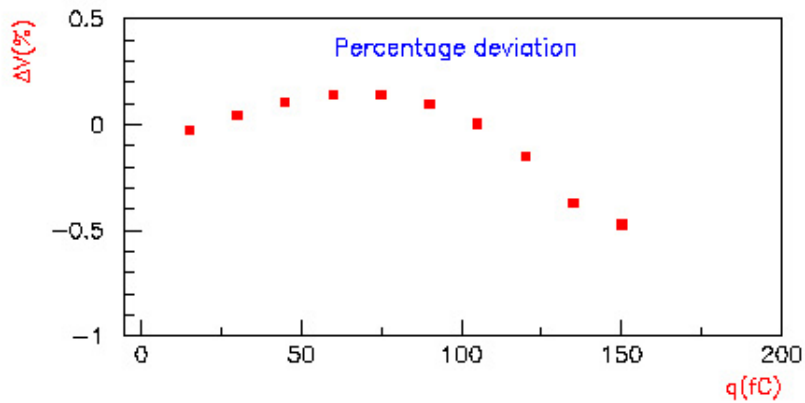
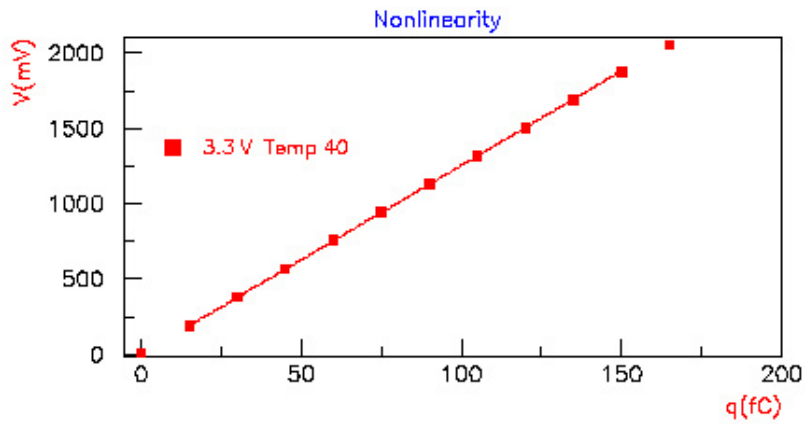
DEVELOPMENT OF A PASA FOR THE FAST-TRD FOR THE CBM EXPERIMENT (R&D)

FAST-TRD PREAMPLIFIER schematic : Sep 23 11:40:55 2005

Transient Response



SIMULATIONS RESULTS



SUMMARY OF THE MAIN PARAMETERS

Parameters	Specifications	Simulated (typical)
Noise	1000e for pad capacitance between 5- 10pF	350e@5pF 412e@10pF 660e@25pF
Conversion gain	12 mV/fC	12.6 mV/fC
FWHM	70 ns	70 ns
Undershoot	-	1mV
Baseline shift	-	3mV
Pad capacitance	5-10 pF	-

OUTLOOK AND PERSPECTIVES

- **Fully custom PASA (AMS 0.35um) for the FAST-TRD has been developed and will be used in the FAST-TRD test beam in feb. 2006**
 - Verification of the concept (detector and electronic requirement) of the FAST-TRD detector
- **Suggestion for long term planning**
 - Close collaboration with the detector development/R&D groups.
 - Development of present PASA in 2004 - 2005 as outcome of the test beam in 2004
 - Investigate a common solution for different detectors
 - Collaborate with other instituts (save money, combined MPW but different/independent projects)
 - R&D period: 2-3 years from now.
 - Technology (0.18micron - 0.13micron)?
 - SOC
 - Topology
 - Signal integrity
 - **Discussion about foundry to be used (IBM, STI, UMC or others) ?**
 - Support, experience, price.

OUTLOOK AND PERSPECTIVES

- **Chip development and testing: 2-3 years after R&D**
 - Need one MPW and one engineer run (about two years, based on previous experience)
 - TPC PASA yield ~99% (~50 000 tested)
 - TRD PASA yield ~99%(20 000 sofare tested)
 - DETNI PASA, 3 circuit tested and all works

Electronic finished 2011. 4 years before FAIR starts

- **Under development**
 - A circuit in IBM 0.13 micron technology that can cover FAST-TRD and possibly several other detectors (programmable), also FOPI jetchamber is interested. (GSI report 2004 and CBM status report)
 - The TOF detector (PhD M. de Gaspari ?).