Radiation tests @PSI 17-19 February 2006

AB/BDI/BL
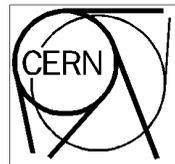
# Irradiation setup for the CFC board at PSI
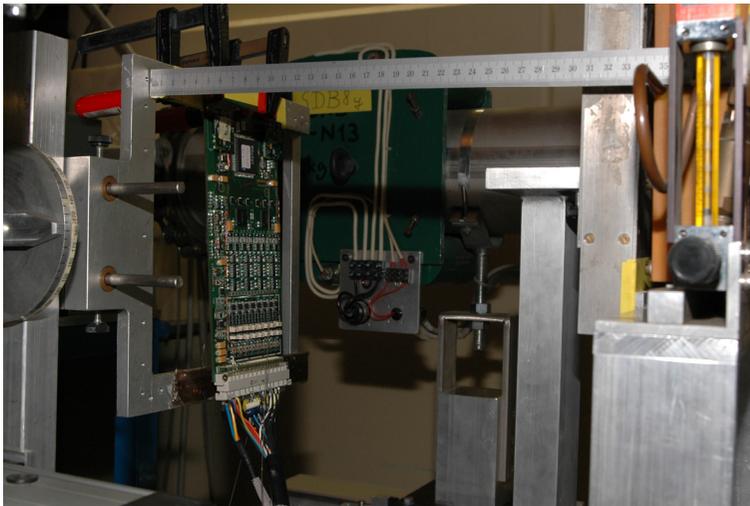
Front view
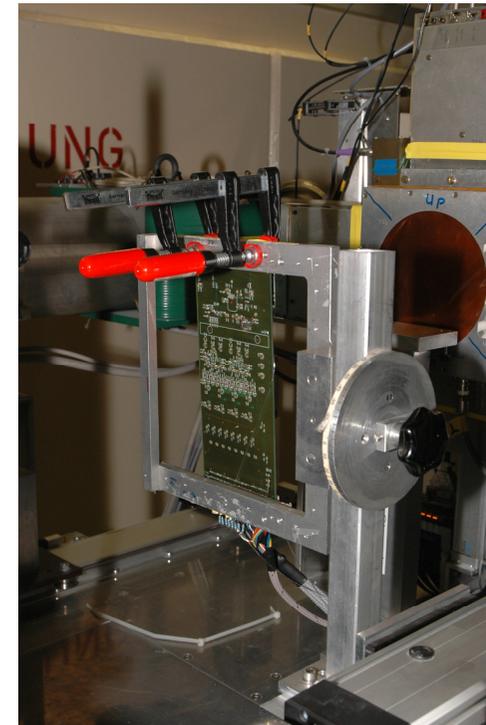
Rear view

Measurements goals

1. Check the functionality of the OPA637after 500 and 1000Gray irradiation.
2. Digital to analog converter
   Check the functionality of the DAC after 500 Gray irradiation.
3. Digital part including FPGA, GOH, ADC, etc.
   Check the SEU and functionality of the digital part during irradiation until 500 Gray.
4. Digital part including FPGA, GOH, ADC, etc.
   Check the SEU and functionality of the digital part during irradiation until 500 Gray.

# OPA637 CH1 (irradiation 0 – 500 Gy)
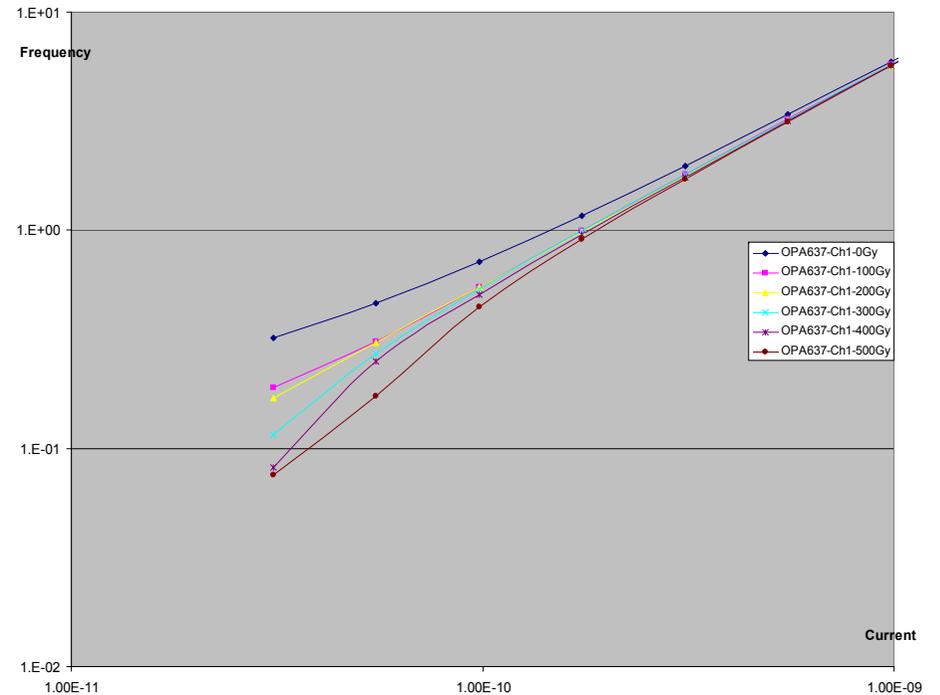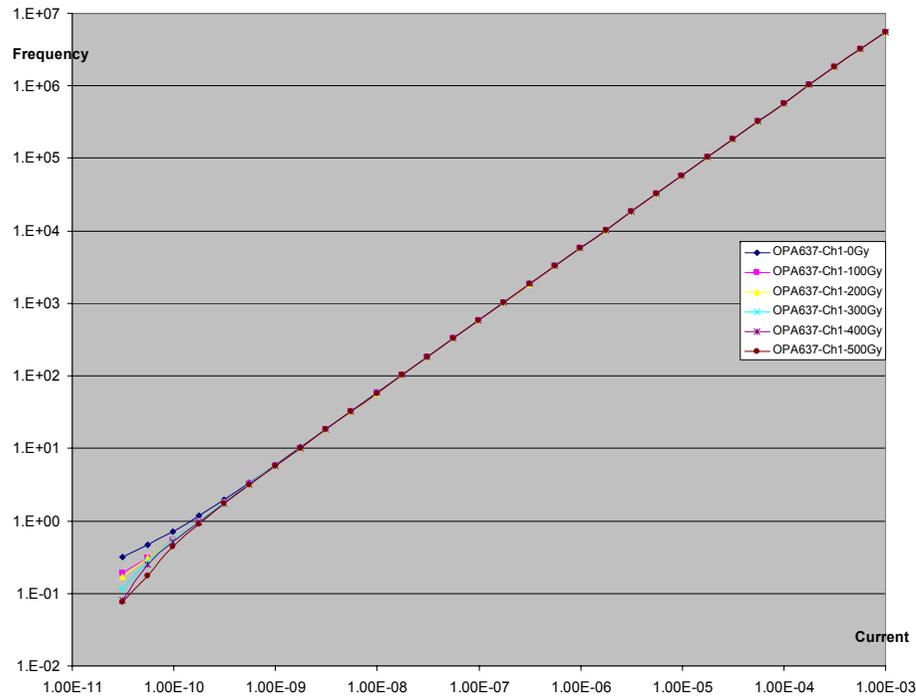
for 500Gy
Delta I = -43.7 pA @ 31pA
Delta I = -45.7 pA @ mean value 31pA to 3.12nA

OPA637 CH1 (irradiation 0 – 500 Gy @ 1nA)
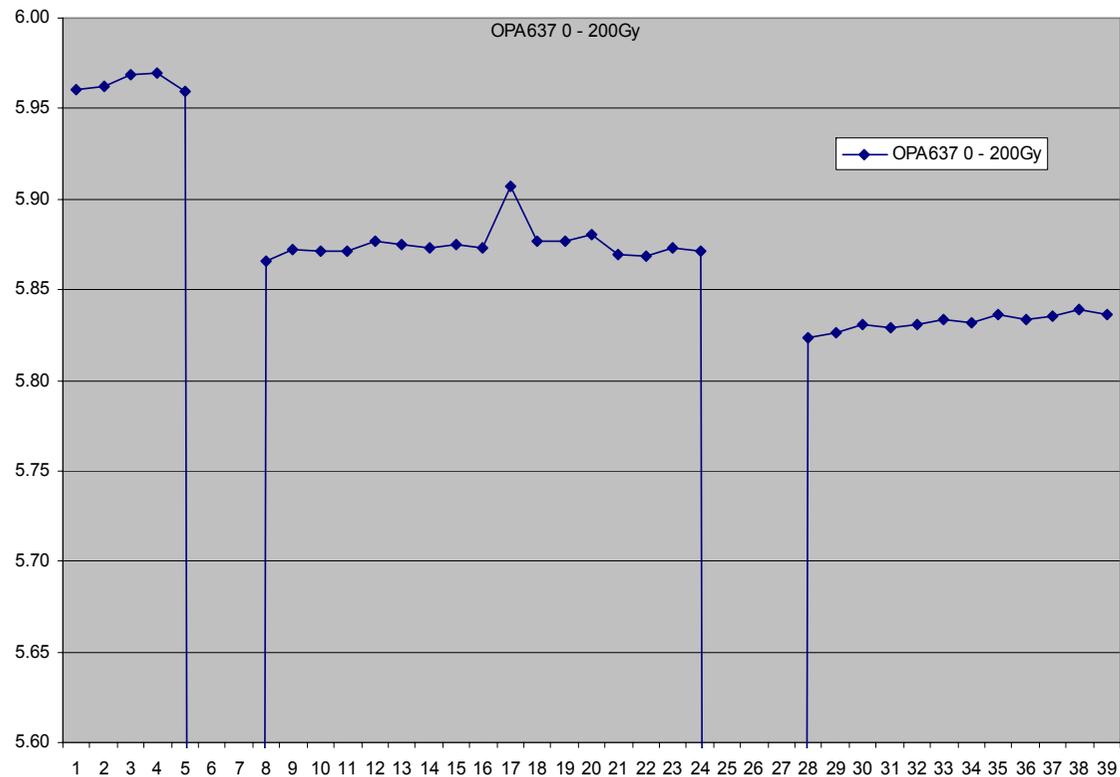
frequency before irradiation f out = 5.96 Hz (1.051nA)

while irradiation CFC output stocked to + Vcc (high negative current)

frequency after irradiation f out = 5.87 Hz (1.052 nA)

while irradiation CFC output stocked to + Vcc (high negative current)

frequency after irradiation f out = 5.83 Hz (1.044 nA)

OPA637 CH1 (irradiation 0 – 500 Gy @ 10nA)
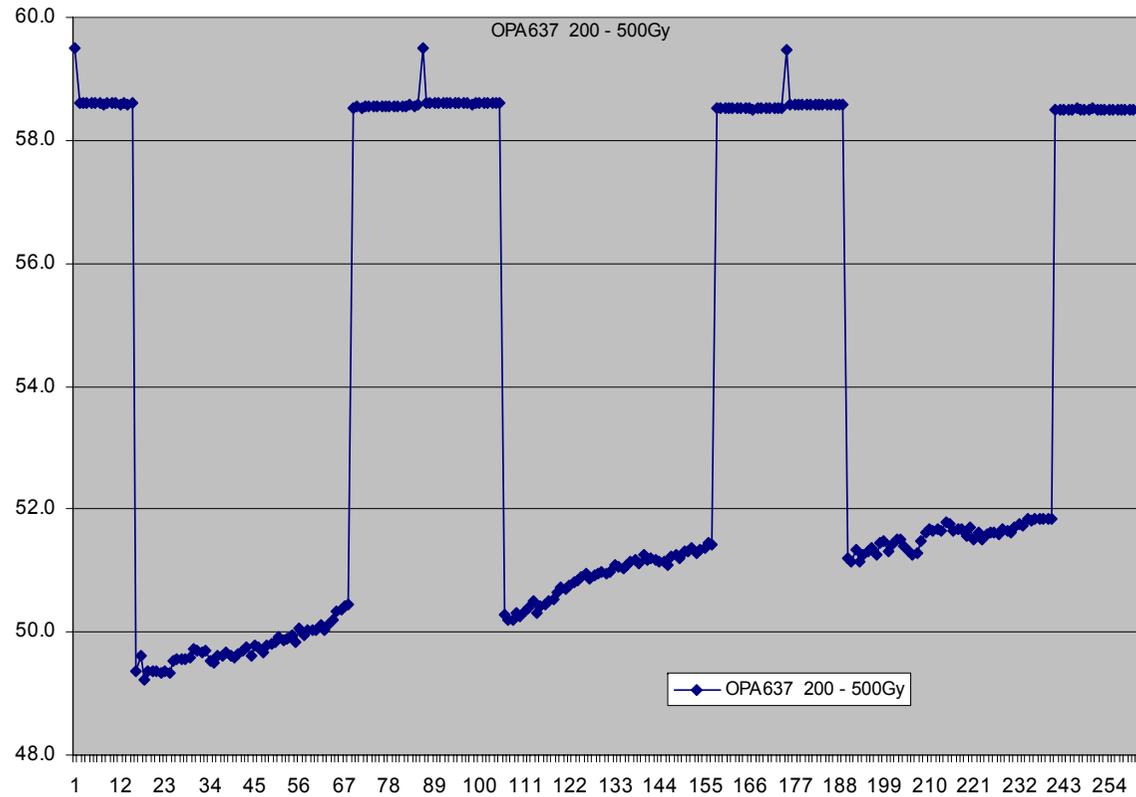
frequency before irradiation f out = 58.6 Hz (10.49 nA)
frequency while irradiation f out = 49.4 - 50.4 Hz (8.839 - 9.031 nA)
frequency after irradiation f out = 58.6 Hz (10.48 nA)
frequency while irradiation f out = 50.3 - 51.4 Hz (8.839 - 9.031 nA)
frequency before irradiation f out = 58.6 Hz (10.49 nA)
frequency while irradiation f out = 51.2 - 51.8 Hz (9.168 - 9.281 nA)
frequency after irradiation f out = 58.5 Hz (10.47 nA)

OPA637 CH3 (irradiation 0 – 500 Gy)
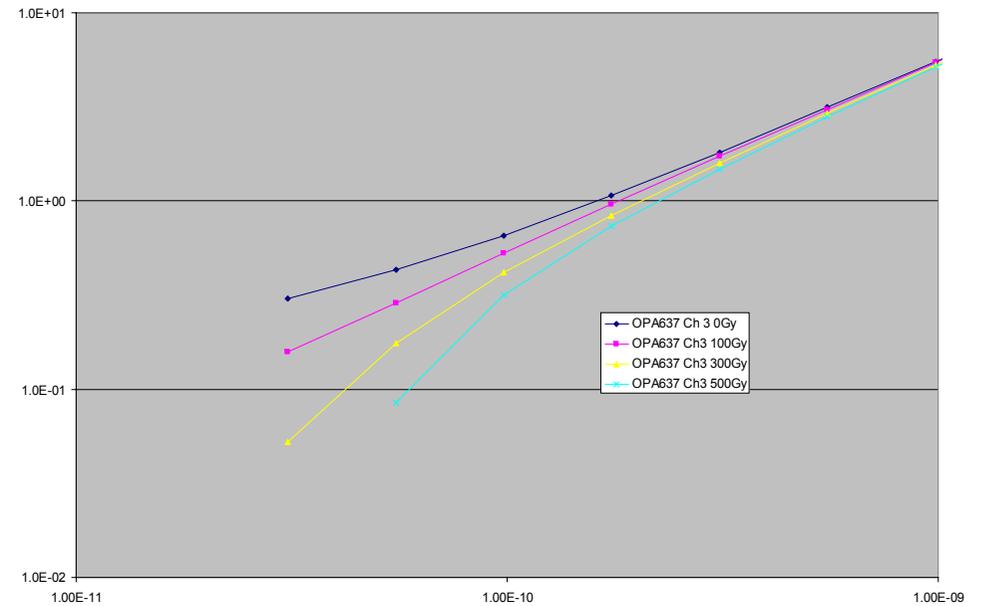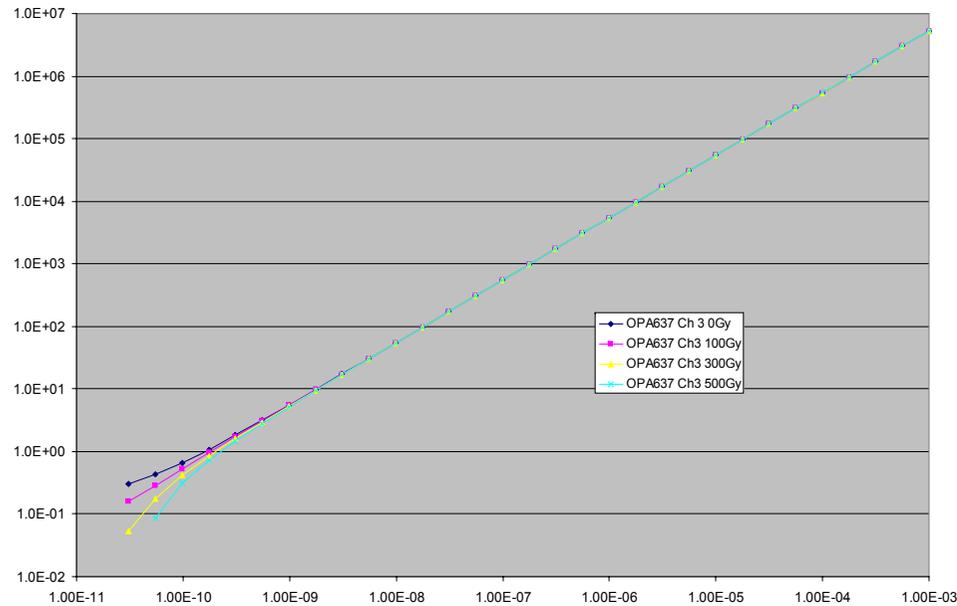
for 500Gy
Delta I = -65.5 pA @ 55.2pA
Delta I = -62.7 pA @ mean value 31pA to 3.12nA

OPA637 CH3 (irradiation 0 – 500 Gy @ 10nA)
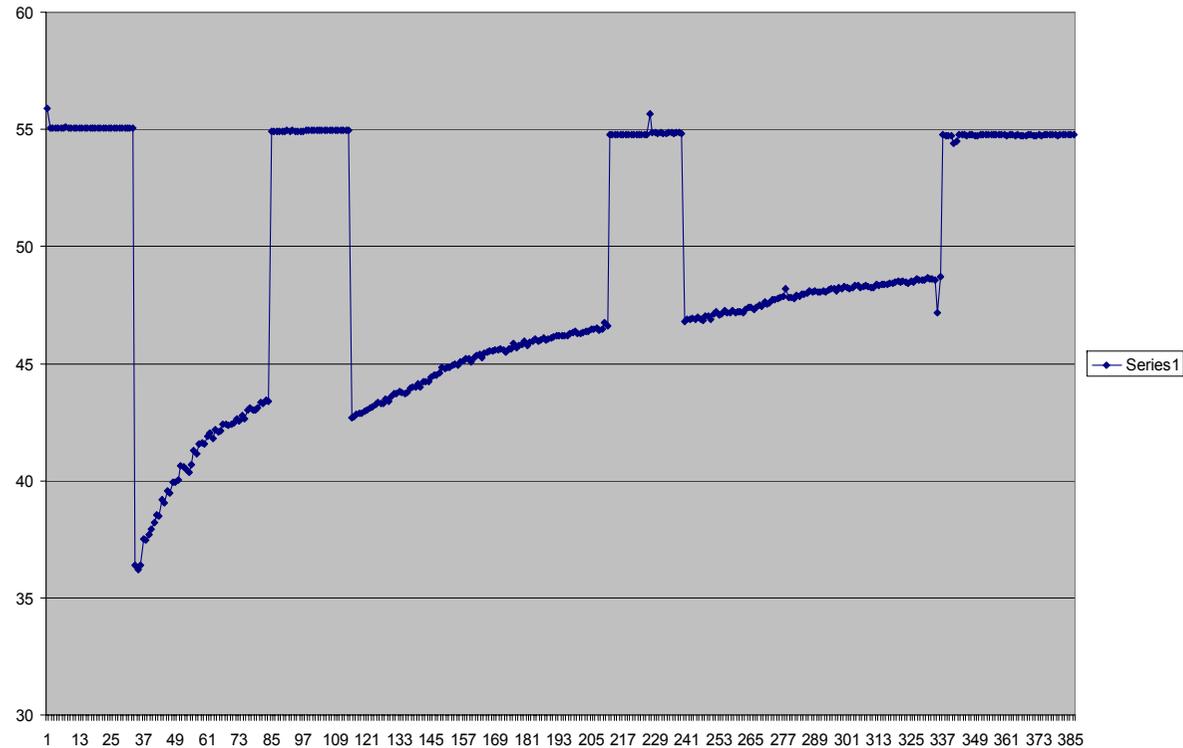
frequency before irradiation f out = 55.1Hz (10.4nA)
frequency while irradiation f out = 36.4 - 43.4 Hz (6.88 - 8.2 nA)
frequency after irradiation f out = 54.9 Hz (10.4 nA)
frequency while irradiation f out = 42.7 - 46.6 Hz (8.07 - 8.81 nA)
frequency after irradiation f out = 54.8 Hz (10.4 nA)
frequency while irradiation f out = 46.8 - 48.7 Hz (8.85 - 9.21 nA)
frequency after irradiation f out = 54.8 Hz (10.4 nA)

OPA637 CH5 (irradiation 0 – 1000 Gy)
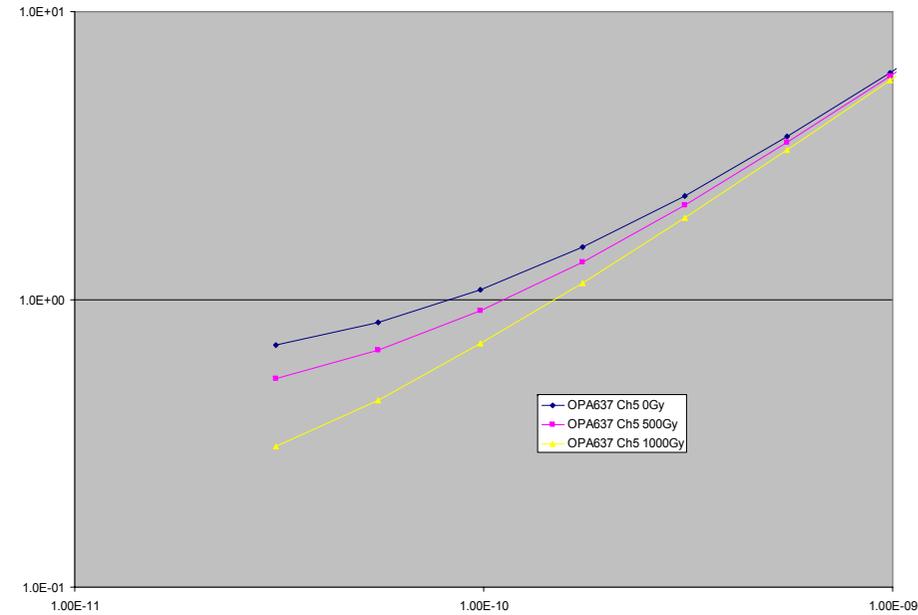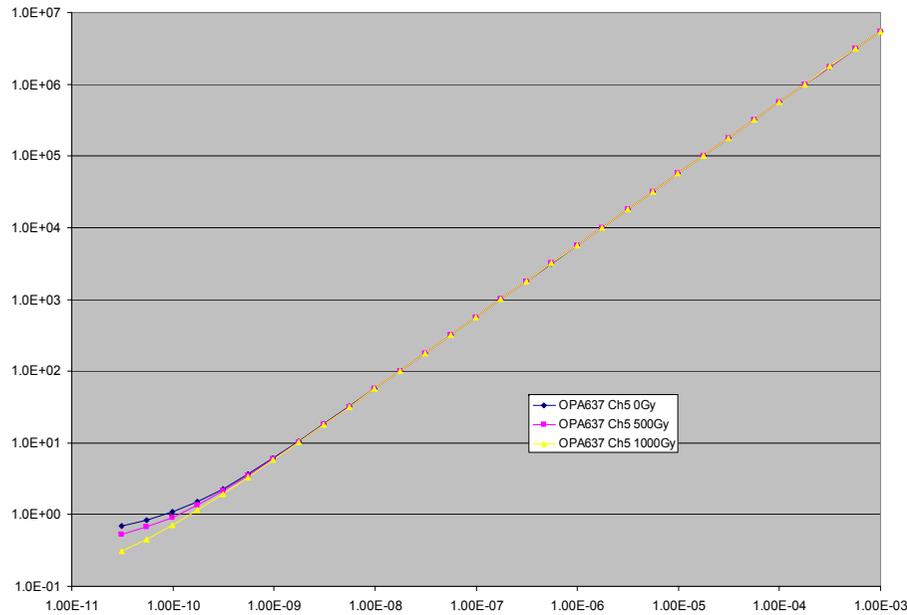
for 500Gy
Delta I = -29.5 pA @ 31pA
Delta I = -29.7 pA @ mean value 31pA to 3.12nA

OPA637 CH5 (irradiation 0 – 1000 Gy @)
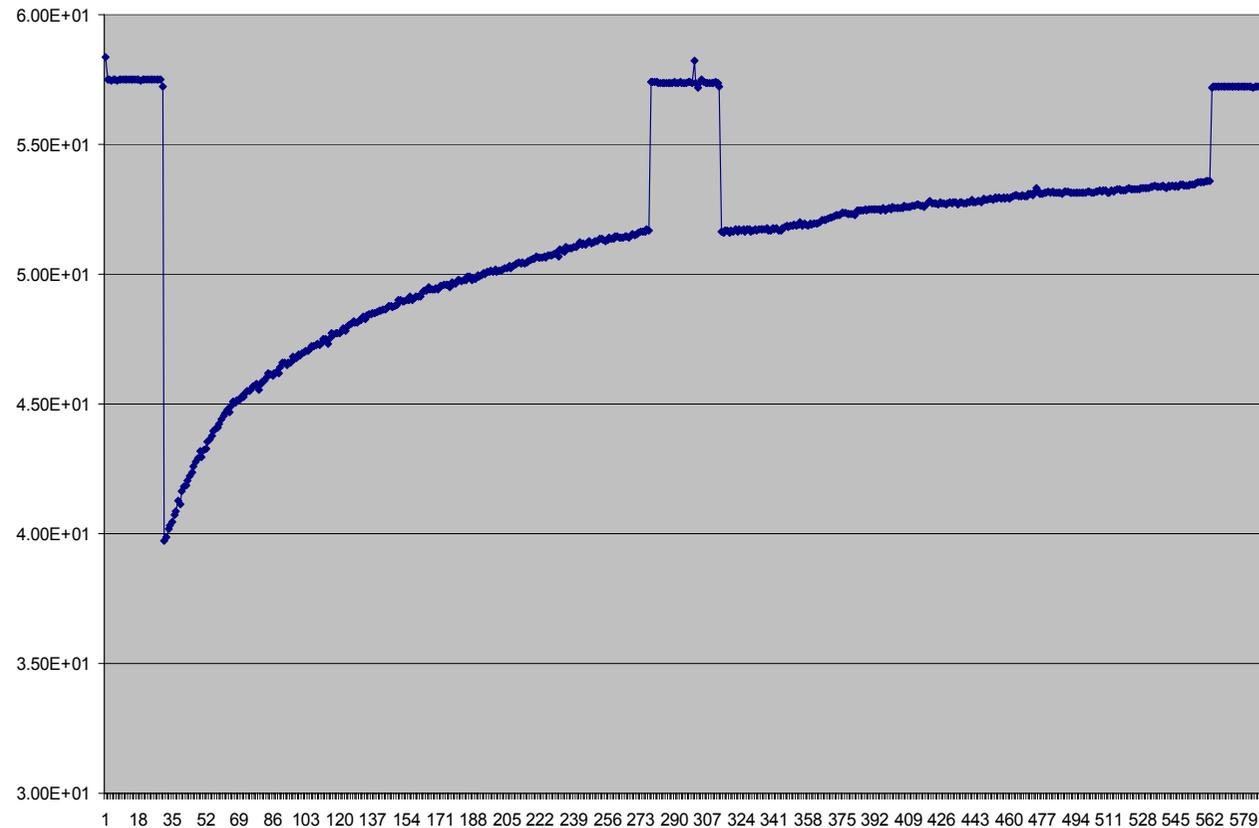
frequency before irradiation f out = 57.5Hz (10.6nA)
frequency while irradiation f out = 39.7 - 51.7 Hz (7.3 - 9.5 nA)
frequency after irradiation f out = 57.4 Hz (10.5 nA)
frequency while irradiation f out = 51.6 - 53.6 Hz (9.49 - 9.85 nA)
frequency after irradiation f out = 57.2 Hz (10.5 nA)

DAC measurements

Beam position
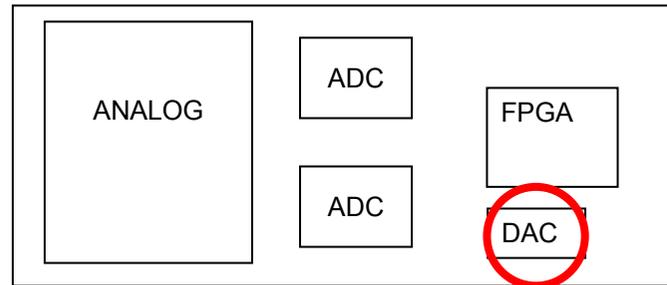
*** Run 22 - DAC test - file: PIF2006_02_18h05m53s45.flw

Start 05:41 End 05:53 (USB file continued recording)

06:03 @ Channel 1 20pA
...
06:08 @ Channel 1 100pA

06:14 End of recording

DAC measurements

Running Sums 80s / board / filtered 8s / Sat Feb 18 05:36:34 2006
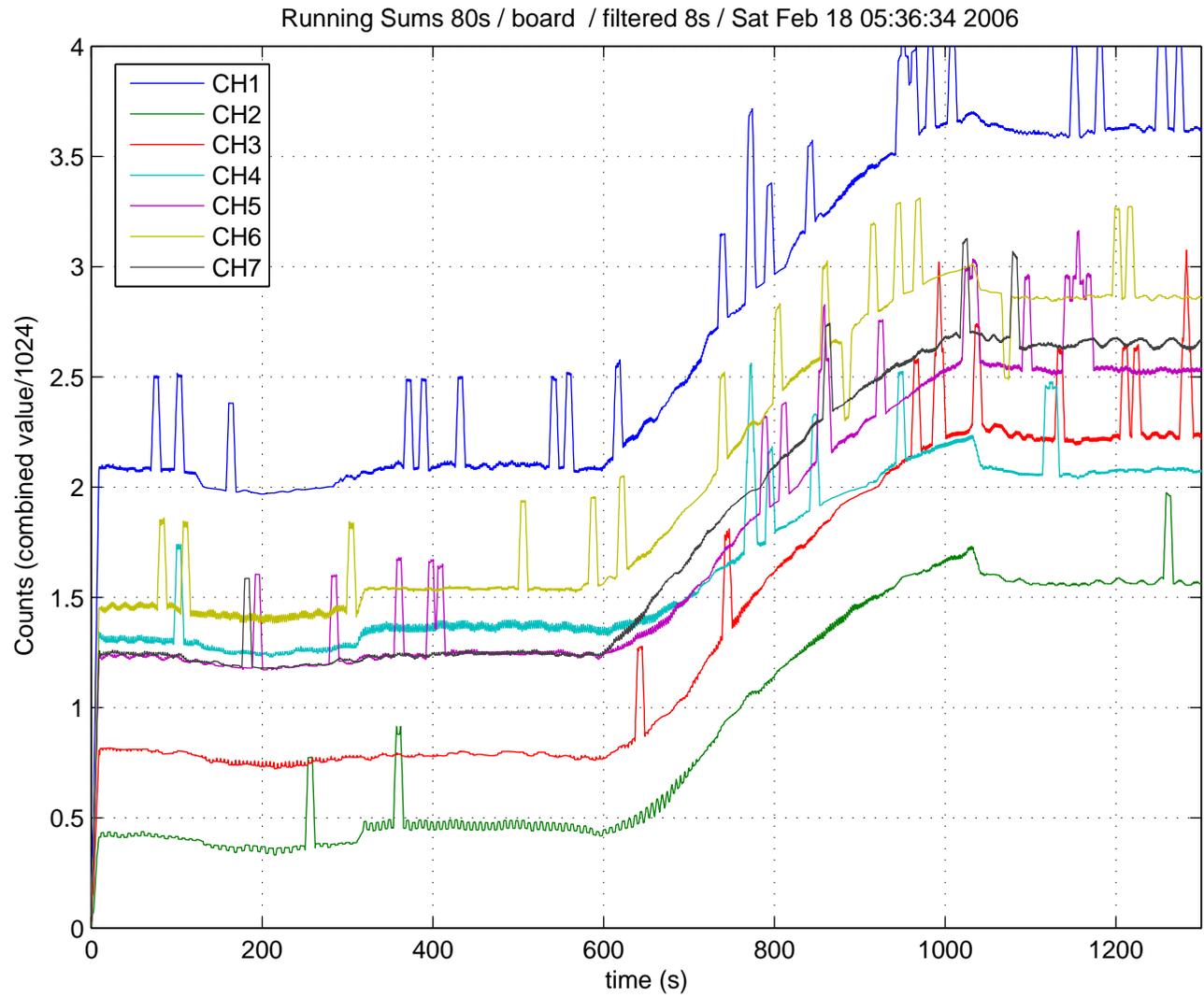
Beam on the FPGA of the Board 1

Beam position
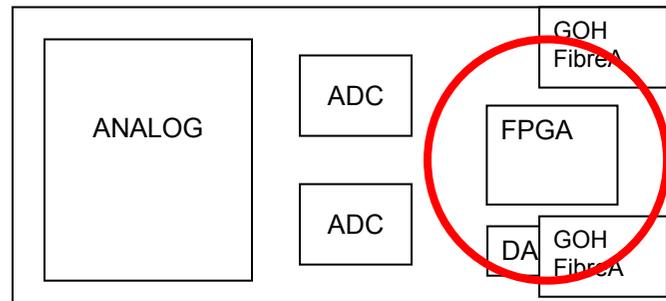
Beam on the FPGA of the Board 1

Histogram of the 8 outputs of the "maximum of the running sums", 40μs.
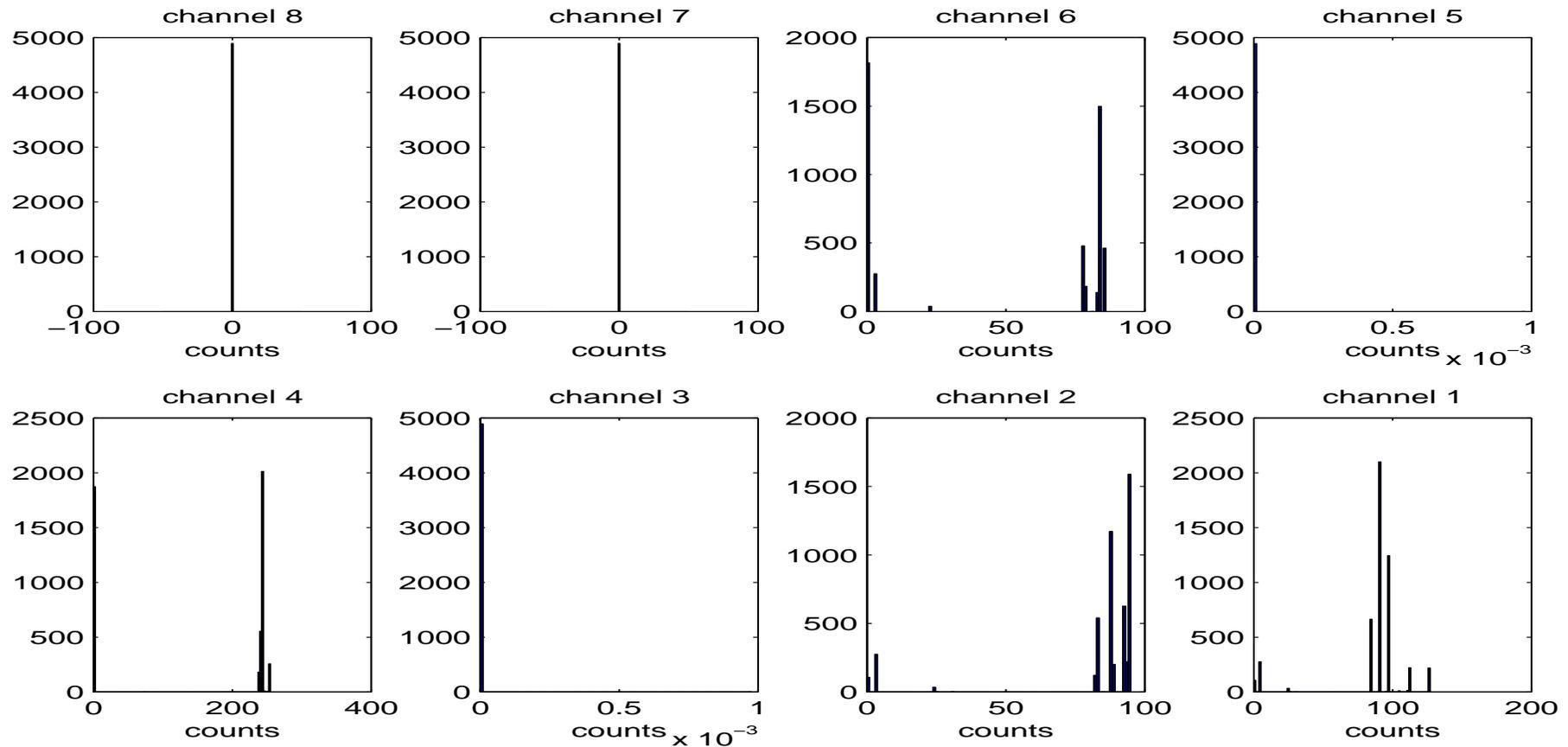
In case of SEU, the results would show a dispersion in the whole range (0 to 200 counts).

Beam on the FPGA of the Board 1
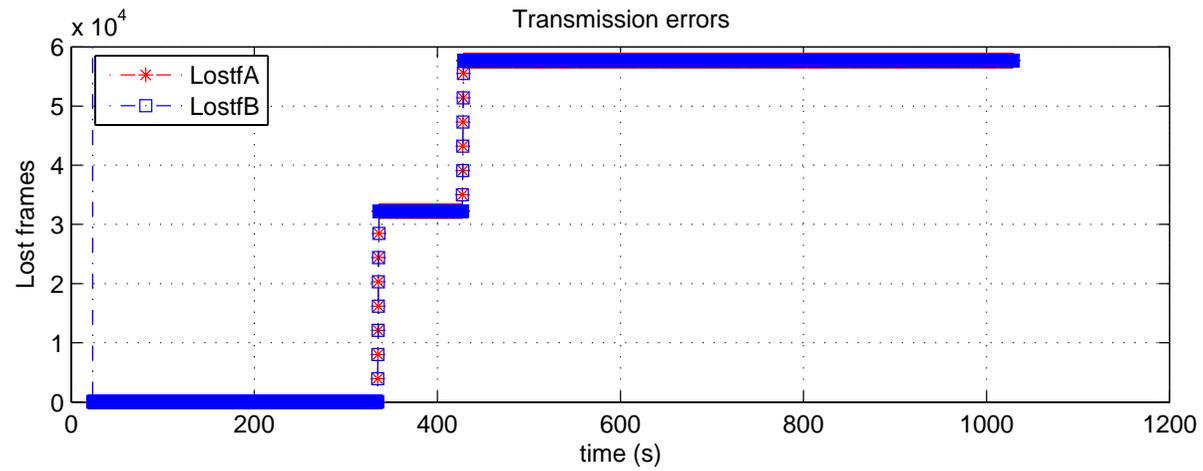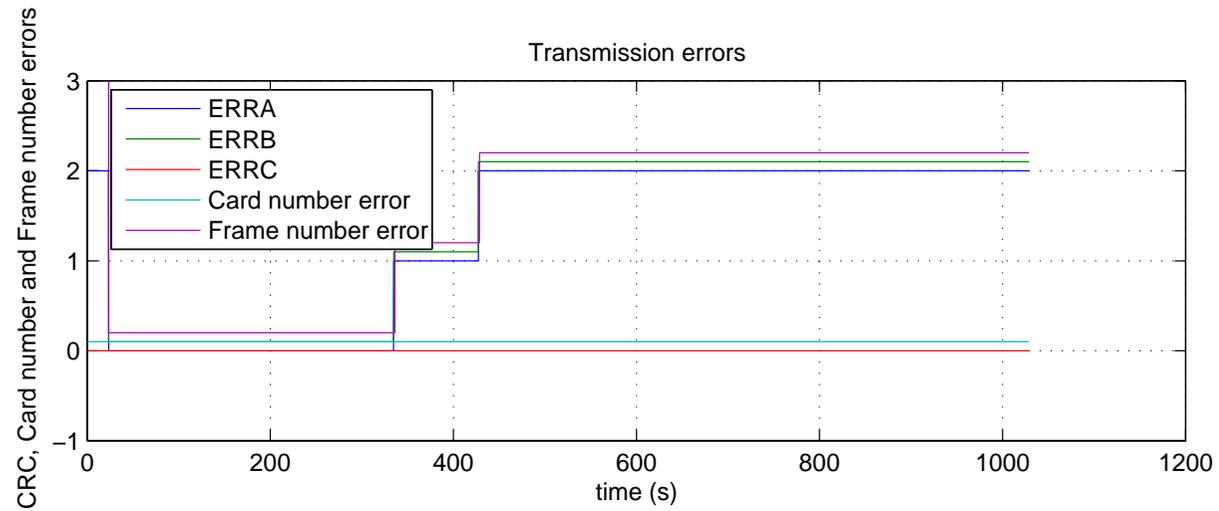
Beam on the FPGA of the Board 1
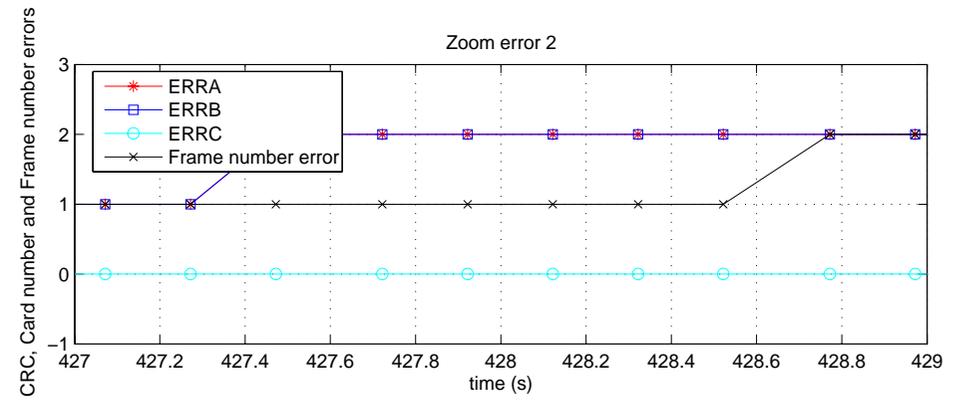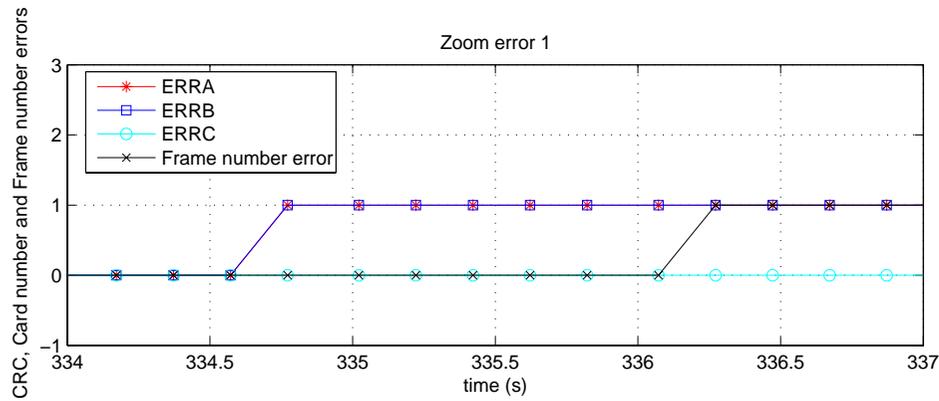
Beam on the FPGA of the Board 2

Histogram of the 8 outputs of the "maximum of the running sums", 40μs.
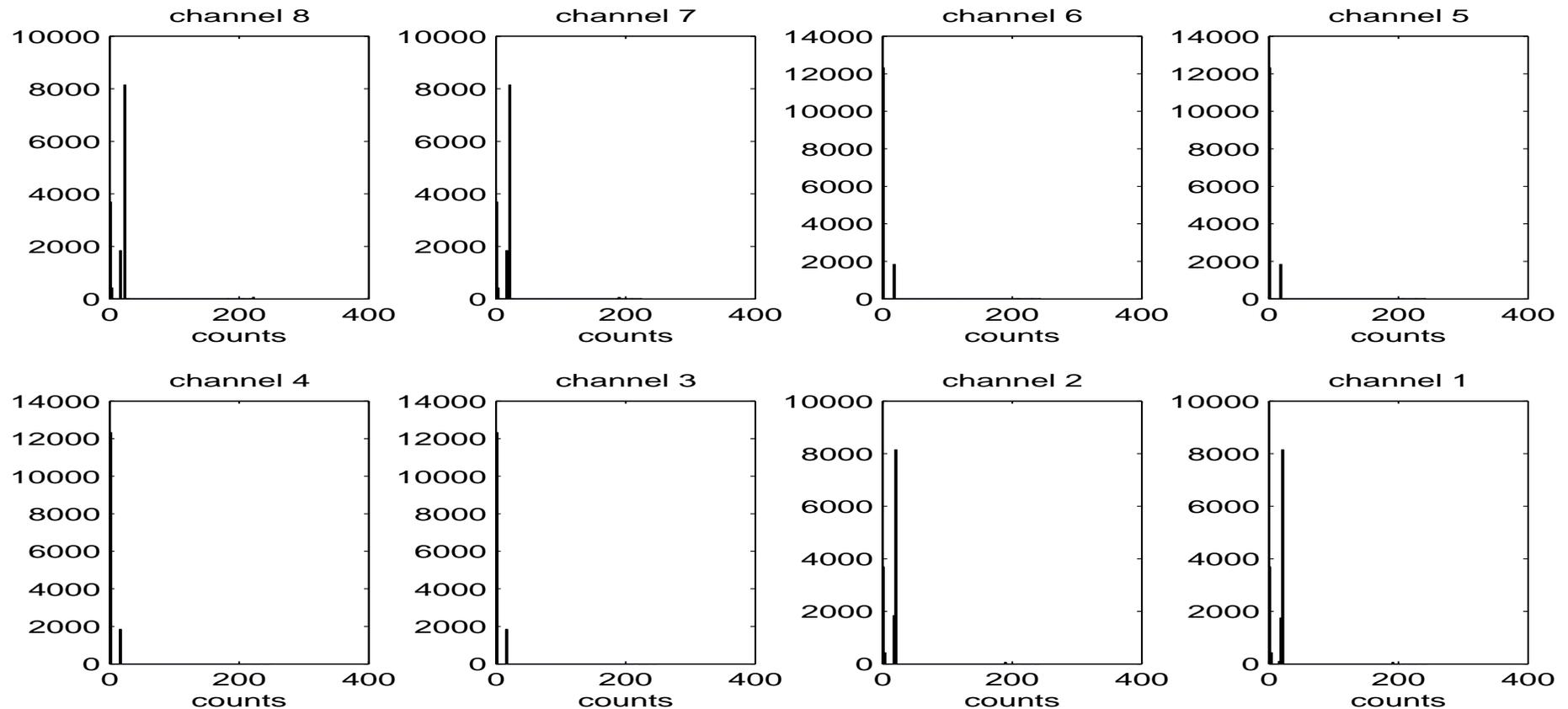

In case of SEU, the results would show a dispersion in the whole range (0 to 200 counts).
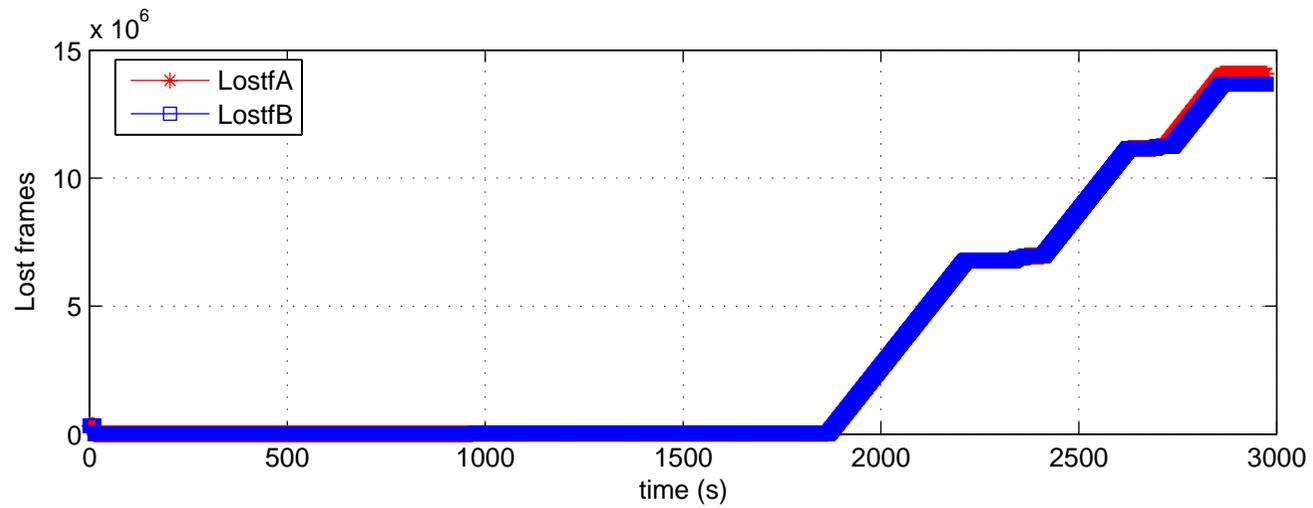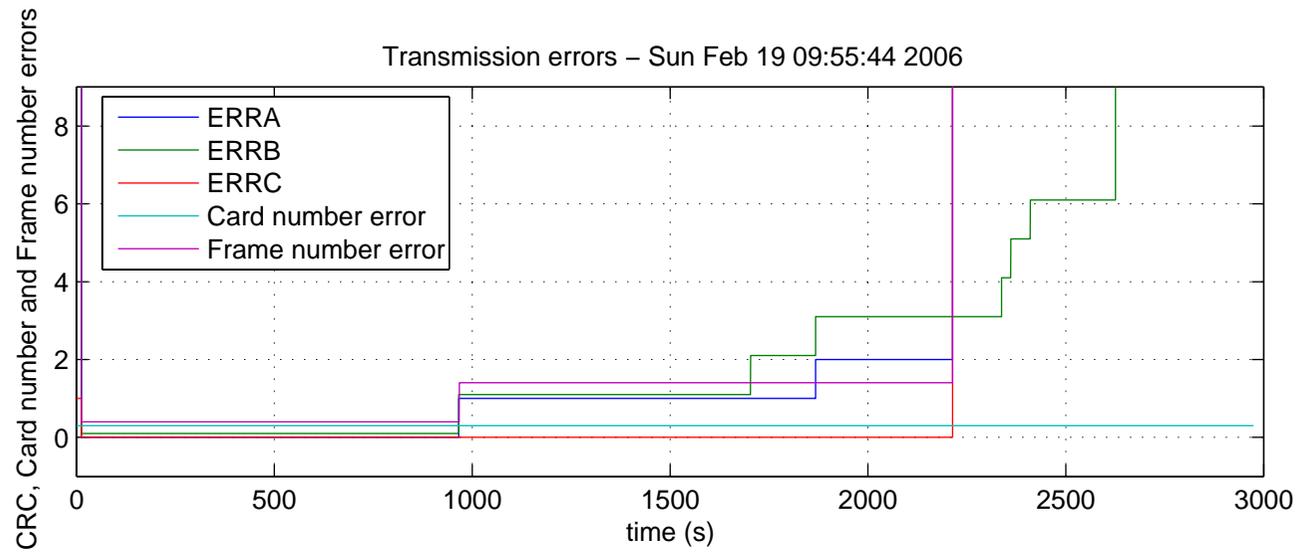
Beam on the FPGA of the Board 2

Beam on the FPGA of the Board 2

Transmission errors Zoom 1 – Sun Feb 19 09:55:44 2006
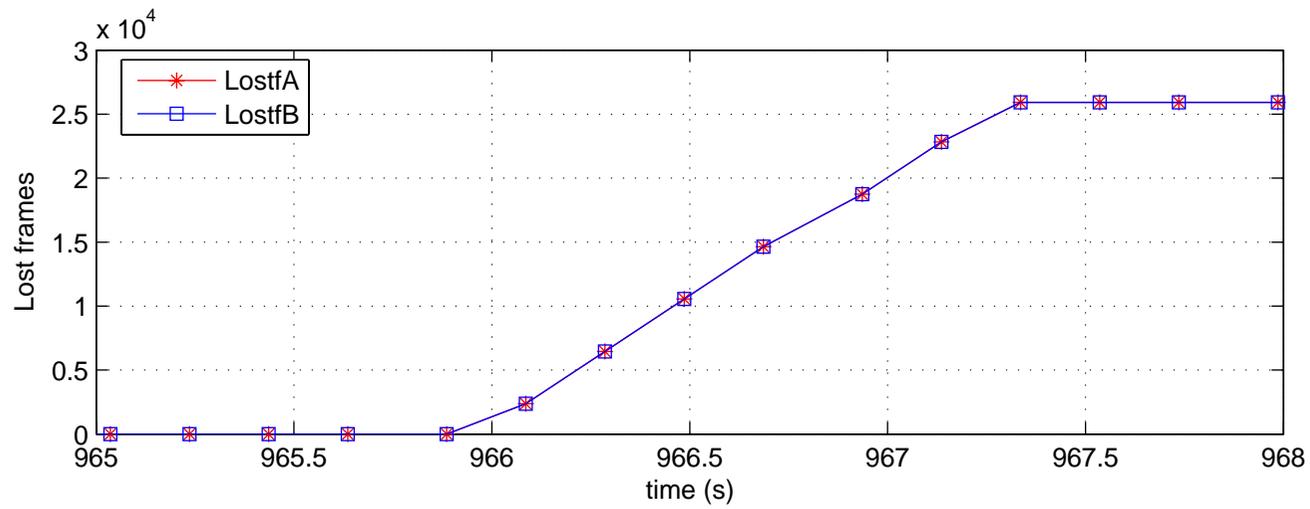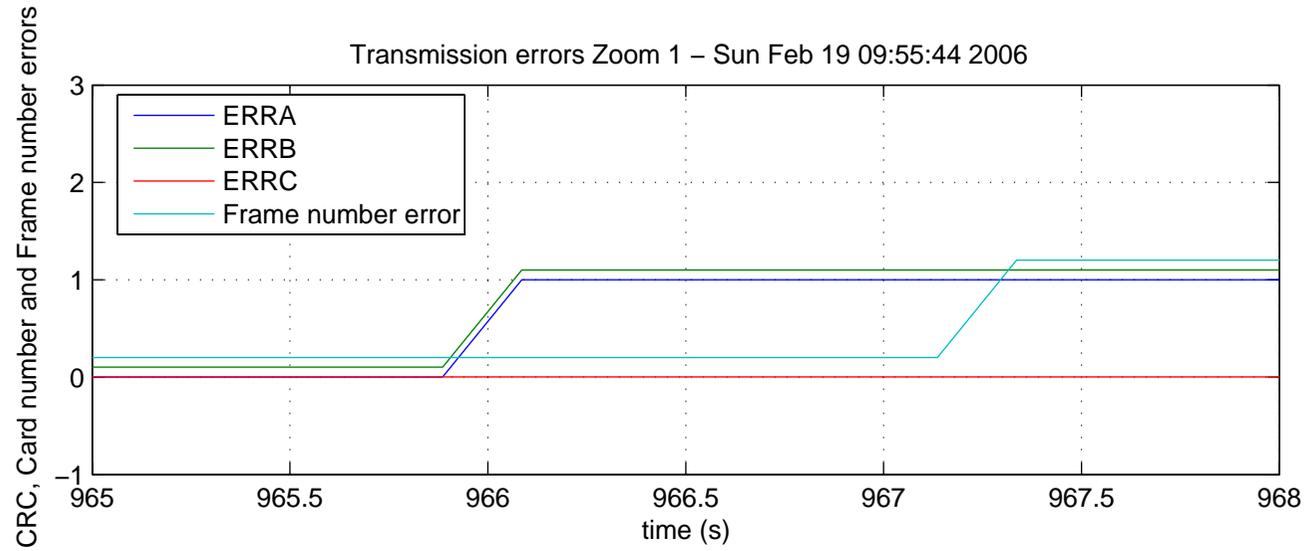
Beam on the Analog part of the Board 1

Data to be found about the
First run on Saturday morning
5:30

Running Sums 80s /Analog board 1 / 0–500Gry / Sun Feb 19 14:25:20 2006
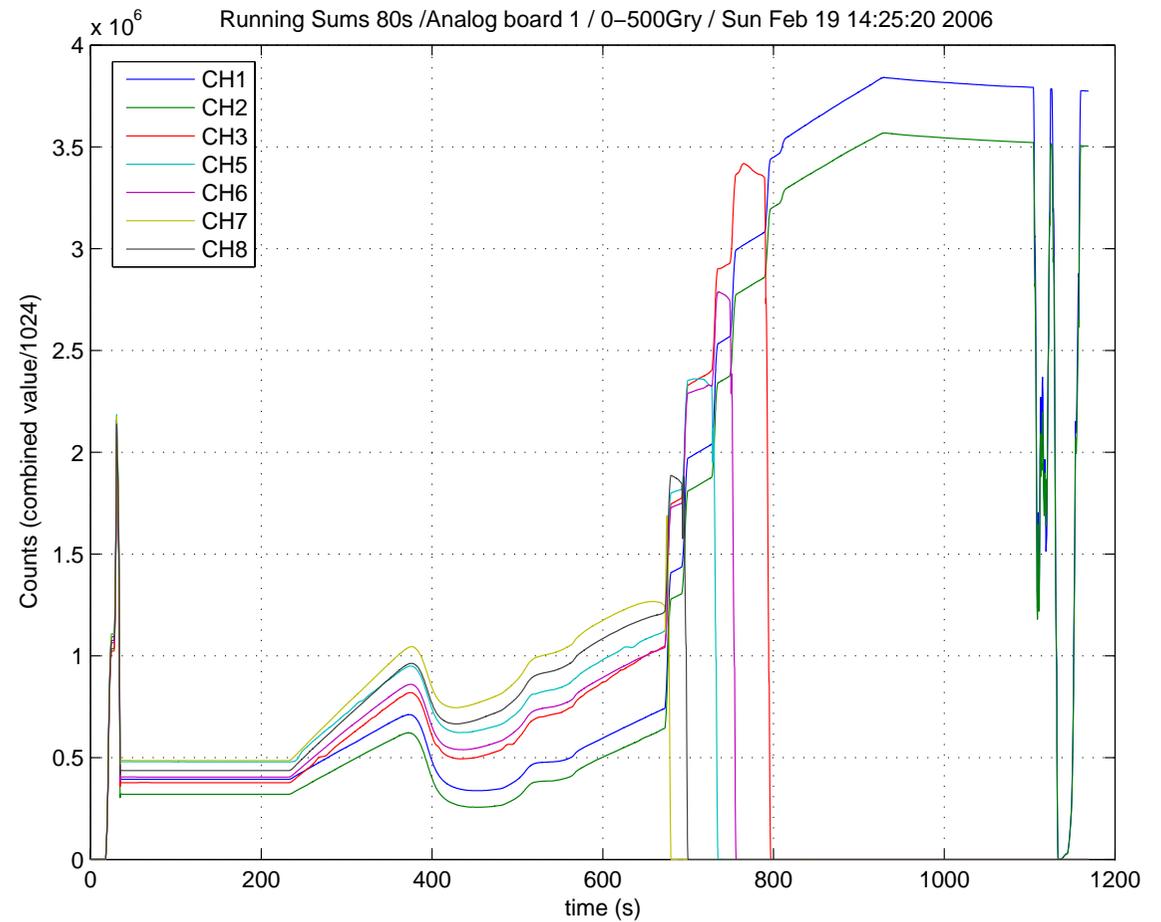
Beam on the Analog part of the Board 2 0-500 Gry

Running Sums 80s / Analog board no2 / 0–500Gry / Part 1 / Sat Feb 18 06:26:03 2006

Running Sums 80s / Analog board no2 / 0–500Gry / Part 2 / Sat Feb 18 06:32:26 2006
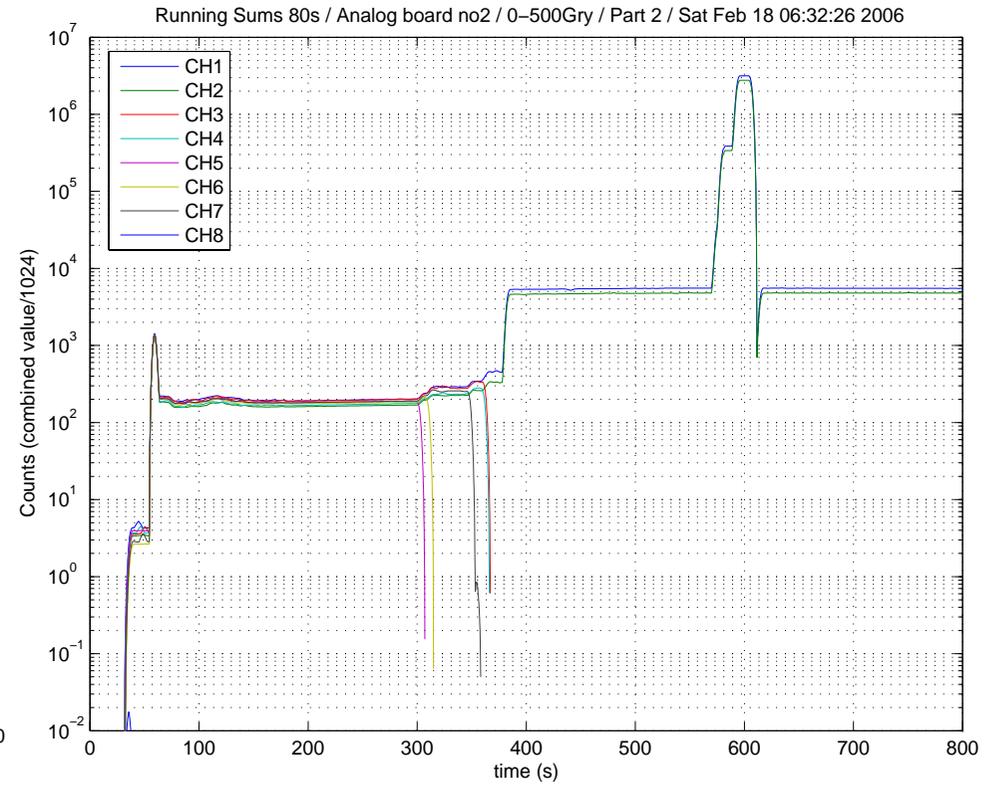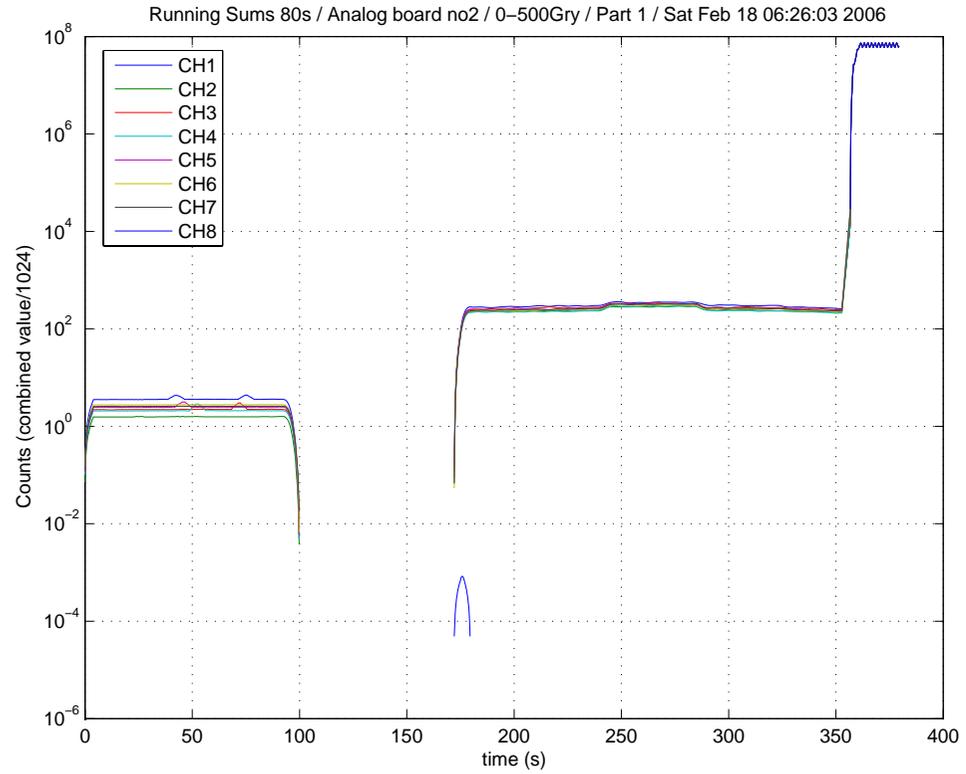
Comparison analog of the board 1 and 2
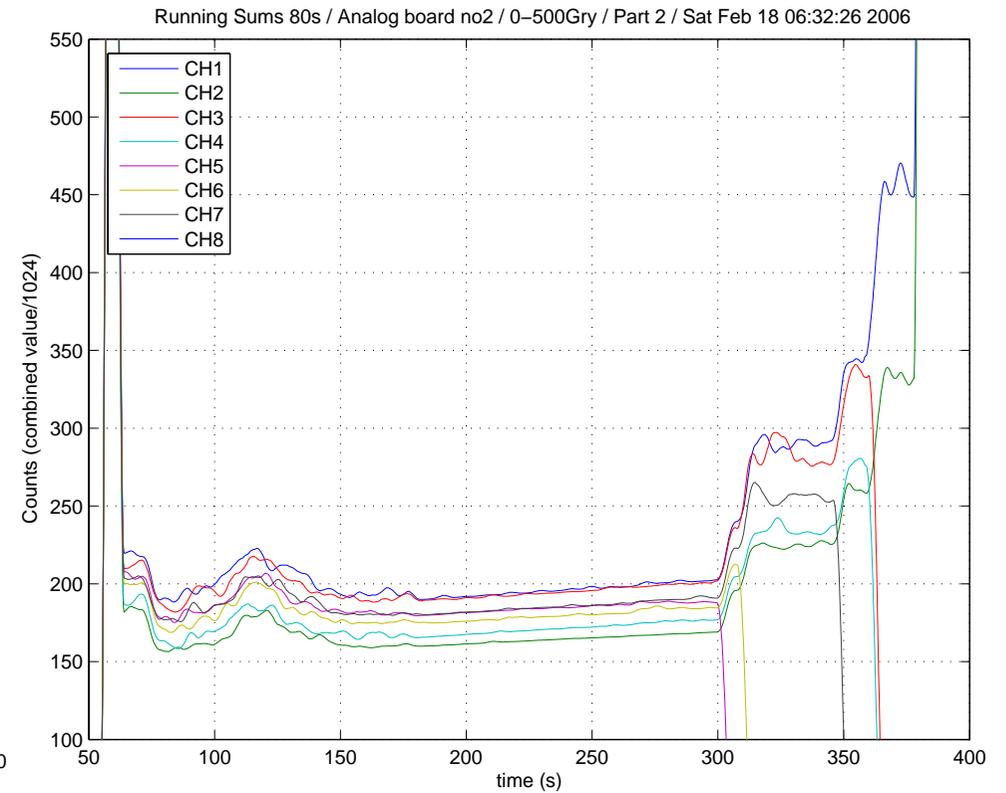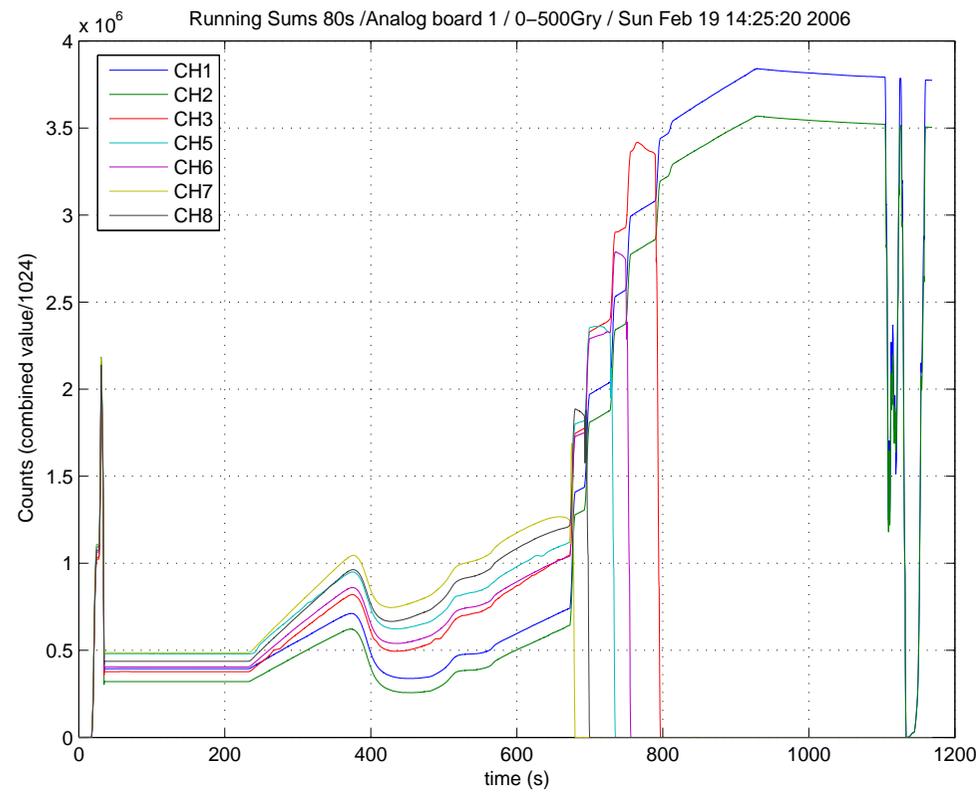
Beam on the one-shot channel 3 and 4 of the Board 5

Running Sums 80s / Analog board no5 / 0–500Gry / oneshot CH3–4 / Part 2 / Sun Feb 19 12:28:28 2006

Beam on the one-shot channel 5 and 6 of the Board 5

Running Sums 80s / Analog board no5 / 0–500Gry / oneshot CH5–6 / Part 1 / Sun Feb 19 13:08:28 2006
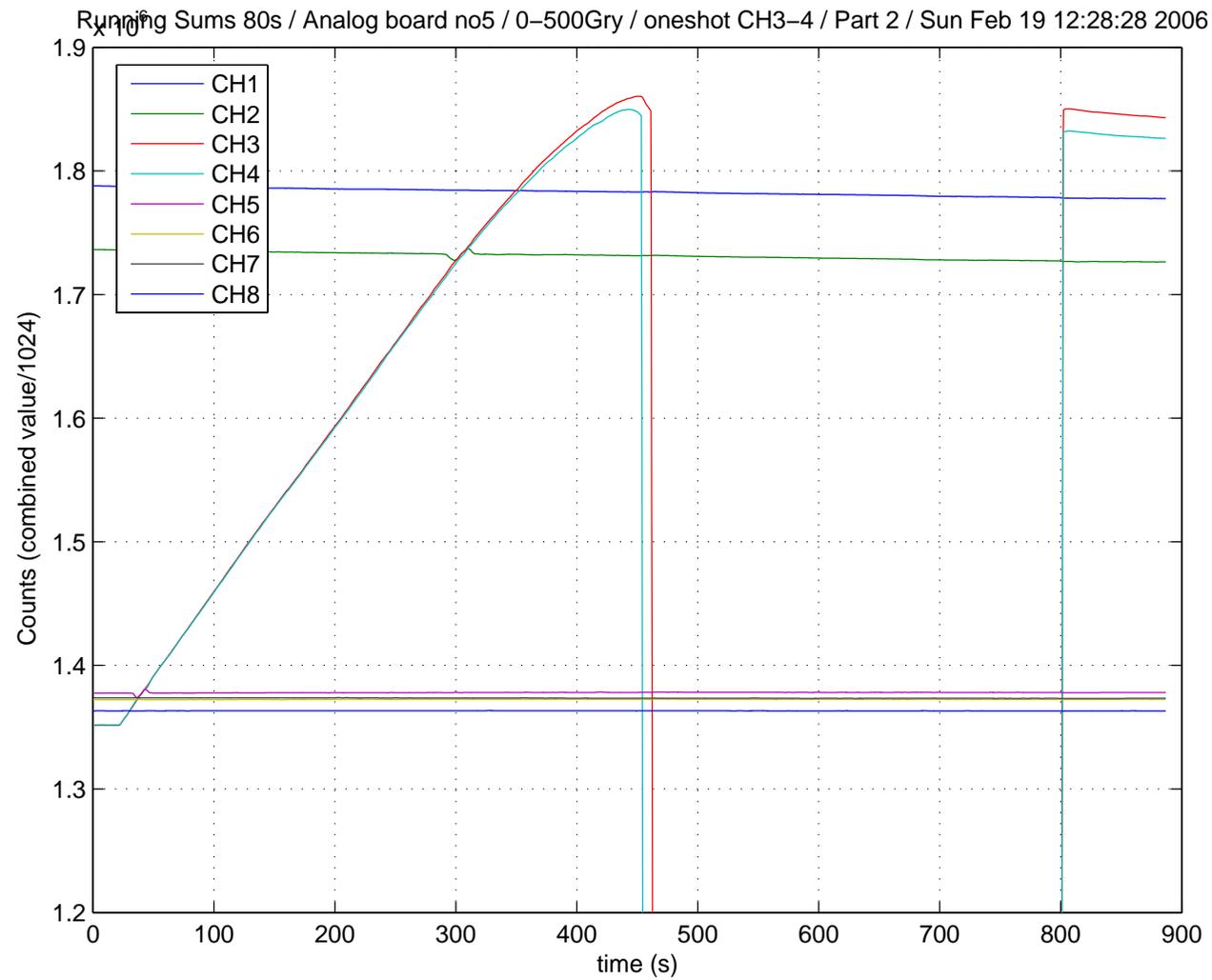
Beam on the comparator 1 Board 5

** Run 09 - file:
CFC Card CID/005 Comparator channel-2
11:06 start
0..100 Gray
** Run 10 - file: PIF2006_02_19h11m14s41.flw
100..200 Gray
** Run 11 - file:
200..300
** Run 12 - file:
300..400
** Run 13 - file:
400..500
11:22 beam line closed

Running Sums 80s / Analog board no5 / 0–100Gry / comparator 1 / Sun Feb 19 11:09:04 2006