ABCD2T Irradiation with neutrons

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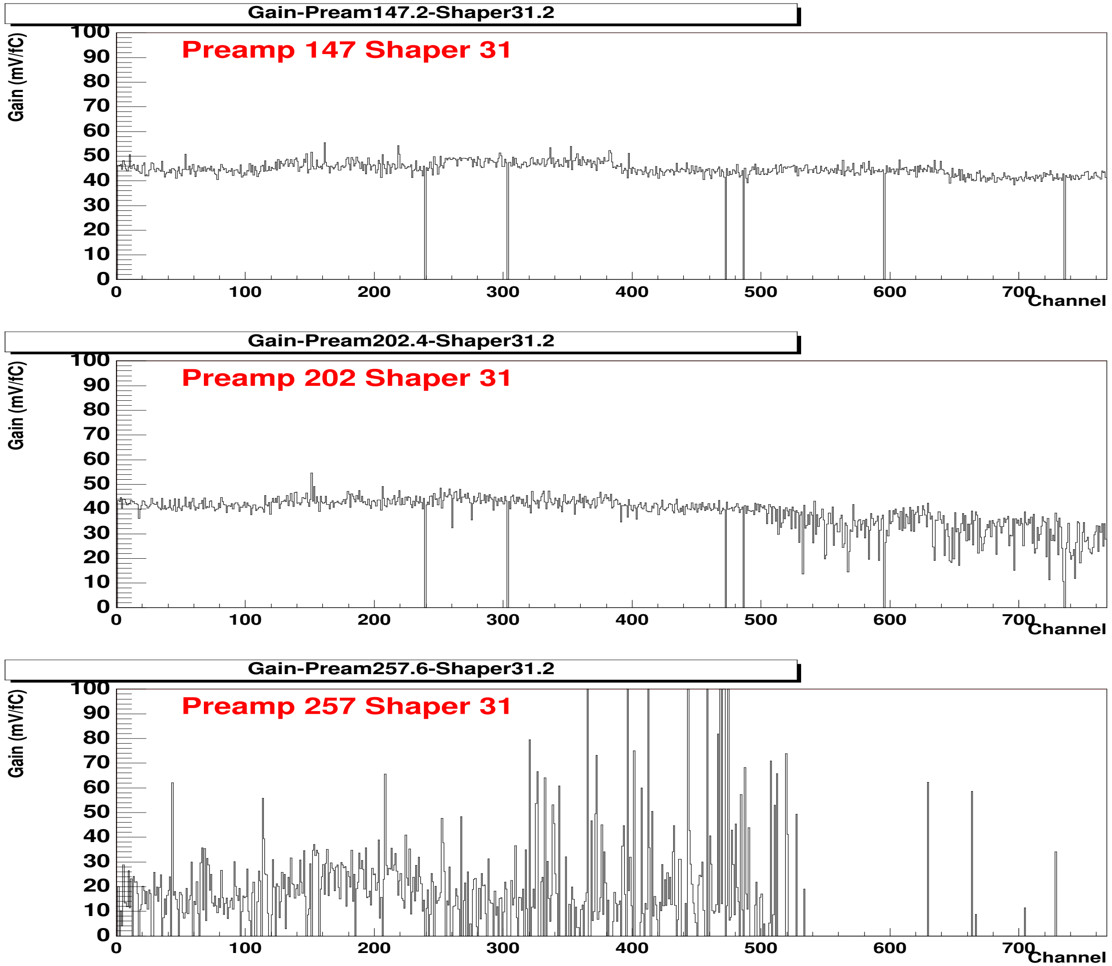
- Oslo Hybrid with 6 ABCD2T chips was irradiated in the reactor in Ljubljana

⇒ This hybrid was irradiated to 1.5×10^{14} n/cm^2 in November
another irradiation with 0.5×10^{14} n/cm^2 was done to get the total fluence of 2×10^{14} n/cm^2

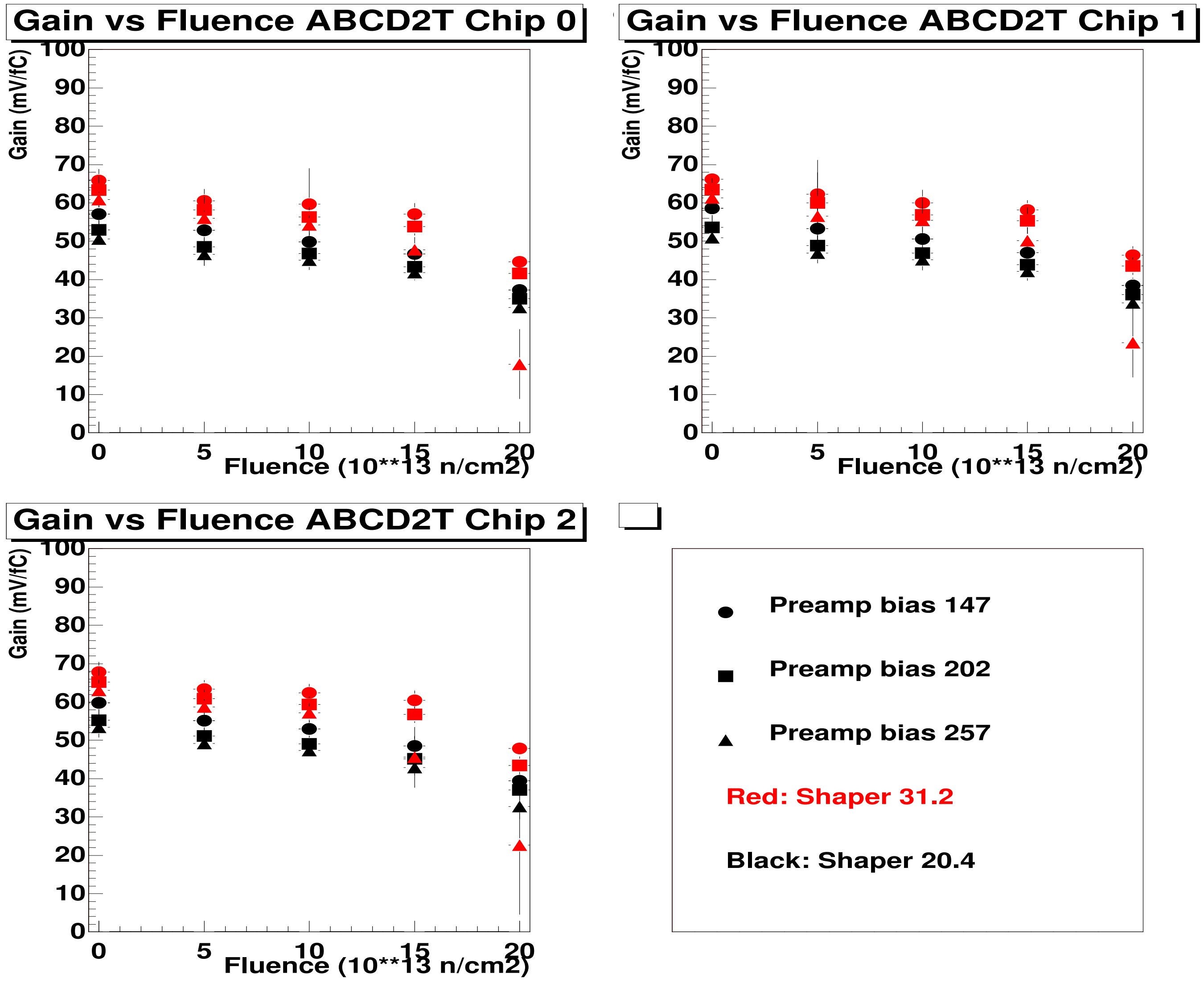
- threshold scans were done:
  - edge detect, edge (01X) data compression
  - pulses 1.5, 2.0 and 2.5 fC
  - at different preamplifier and shaper bias currents settings

• Gain vs channel number after irradiation with 2 x 10^{14} n/cm^2

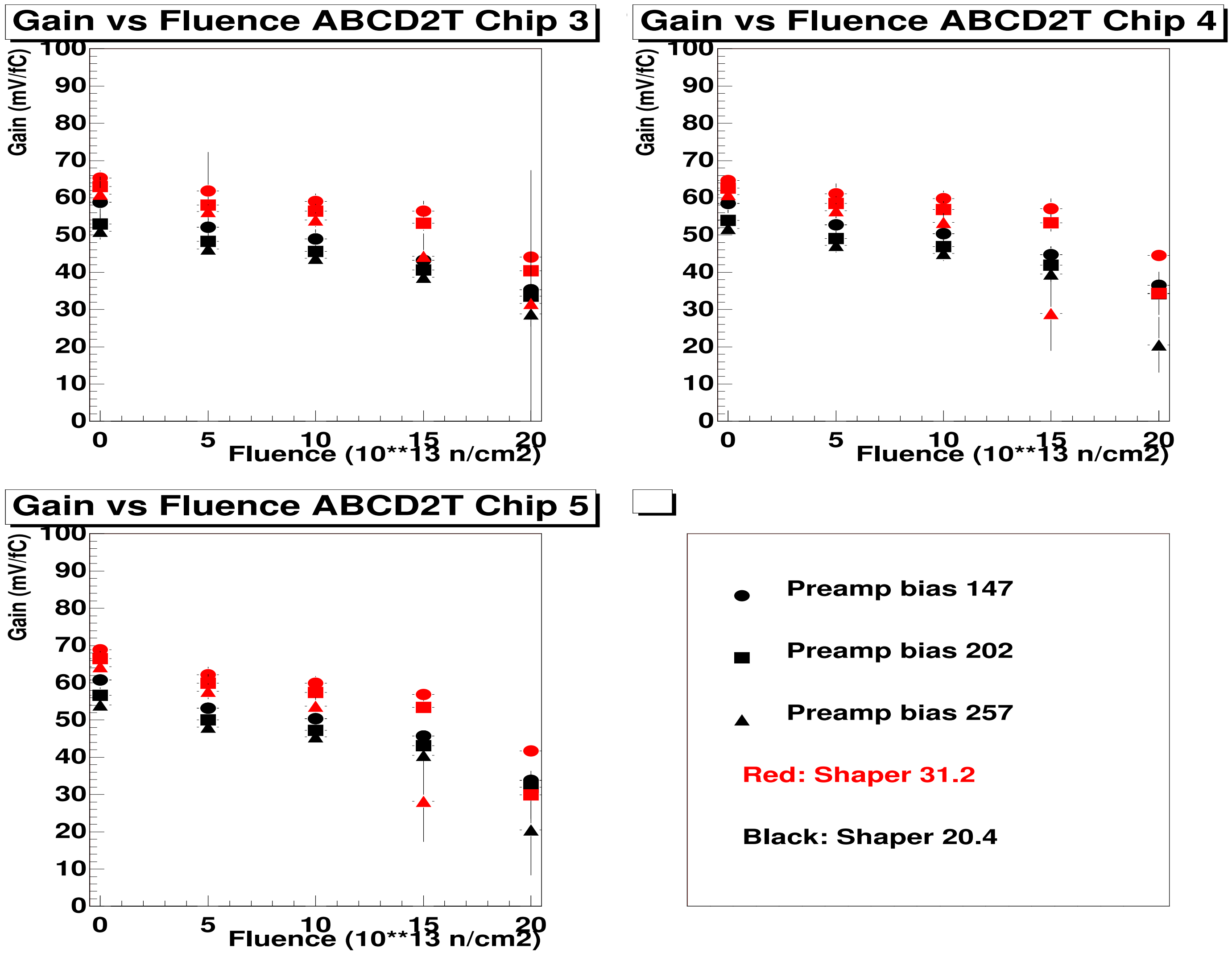
- chips still work at high preamp currents but not very good
- ABCD2T chips irradiated to this fluence in September worked only below 200uA



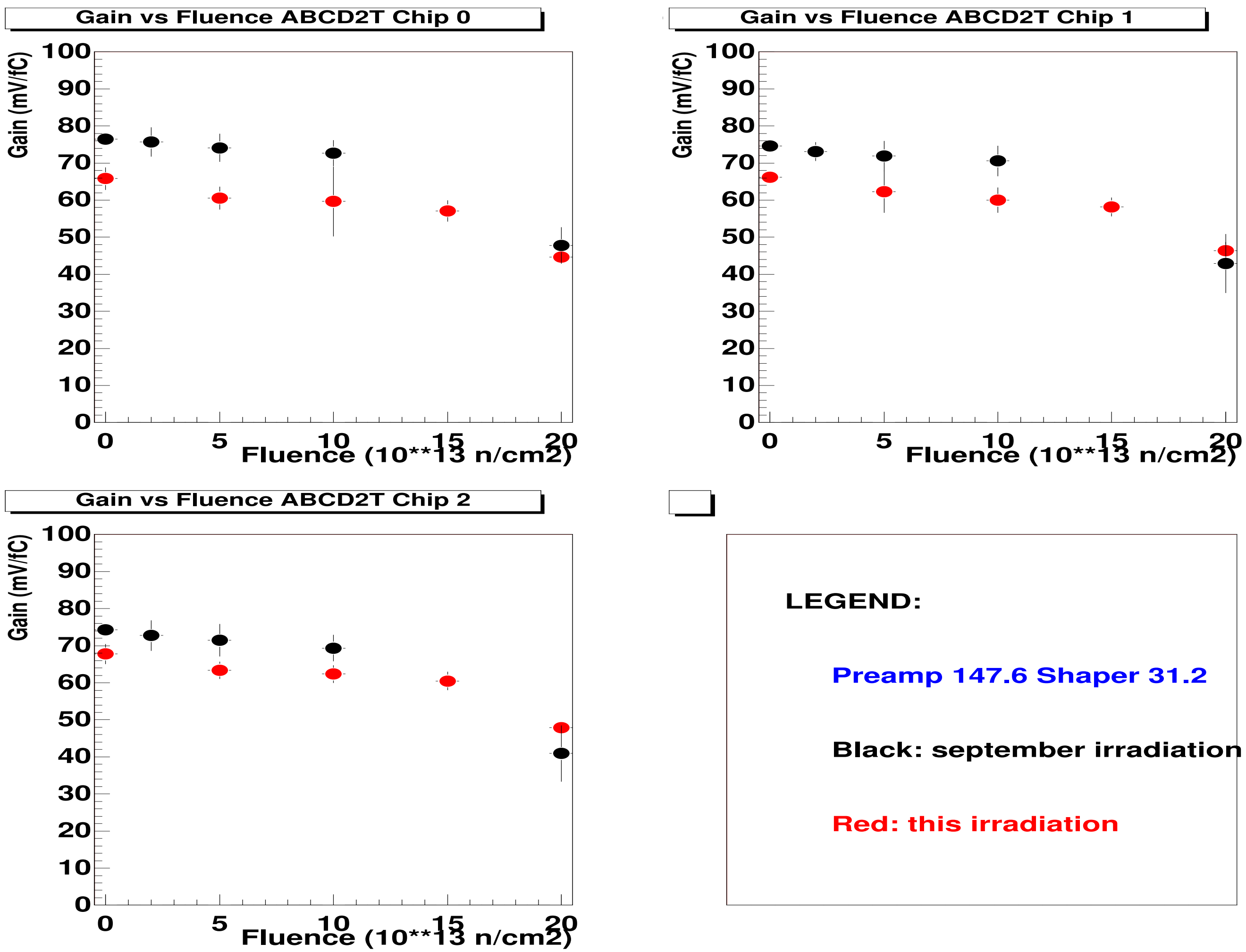
• Gain as a function of fluence chips 0 - 2



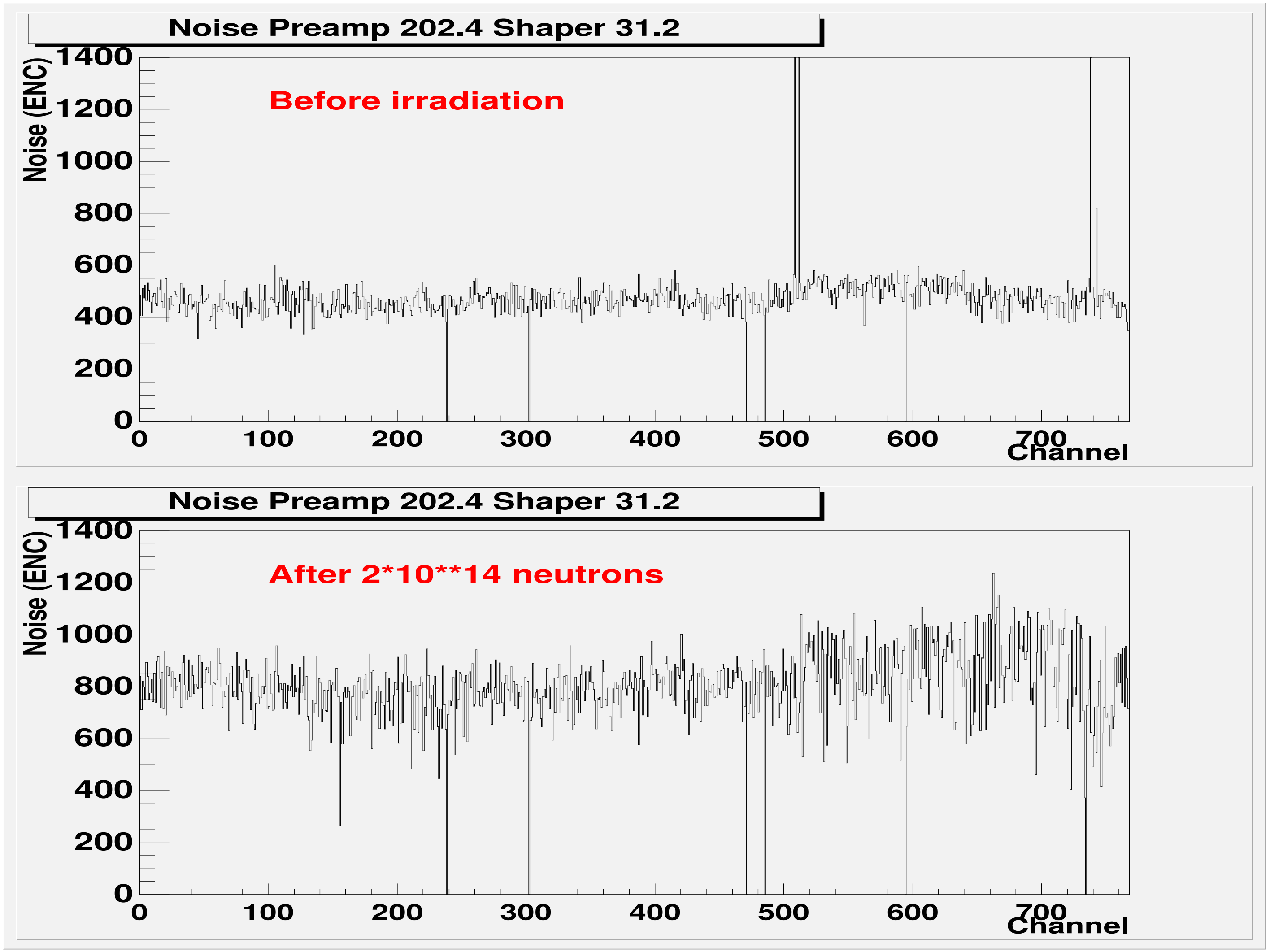
• Gain as a function of fluence chips 3 - 5



- Comparison with the last (September) irradiation
  - a little less degradation at 2 x 10^{14} n/cm^2 than in September

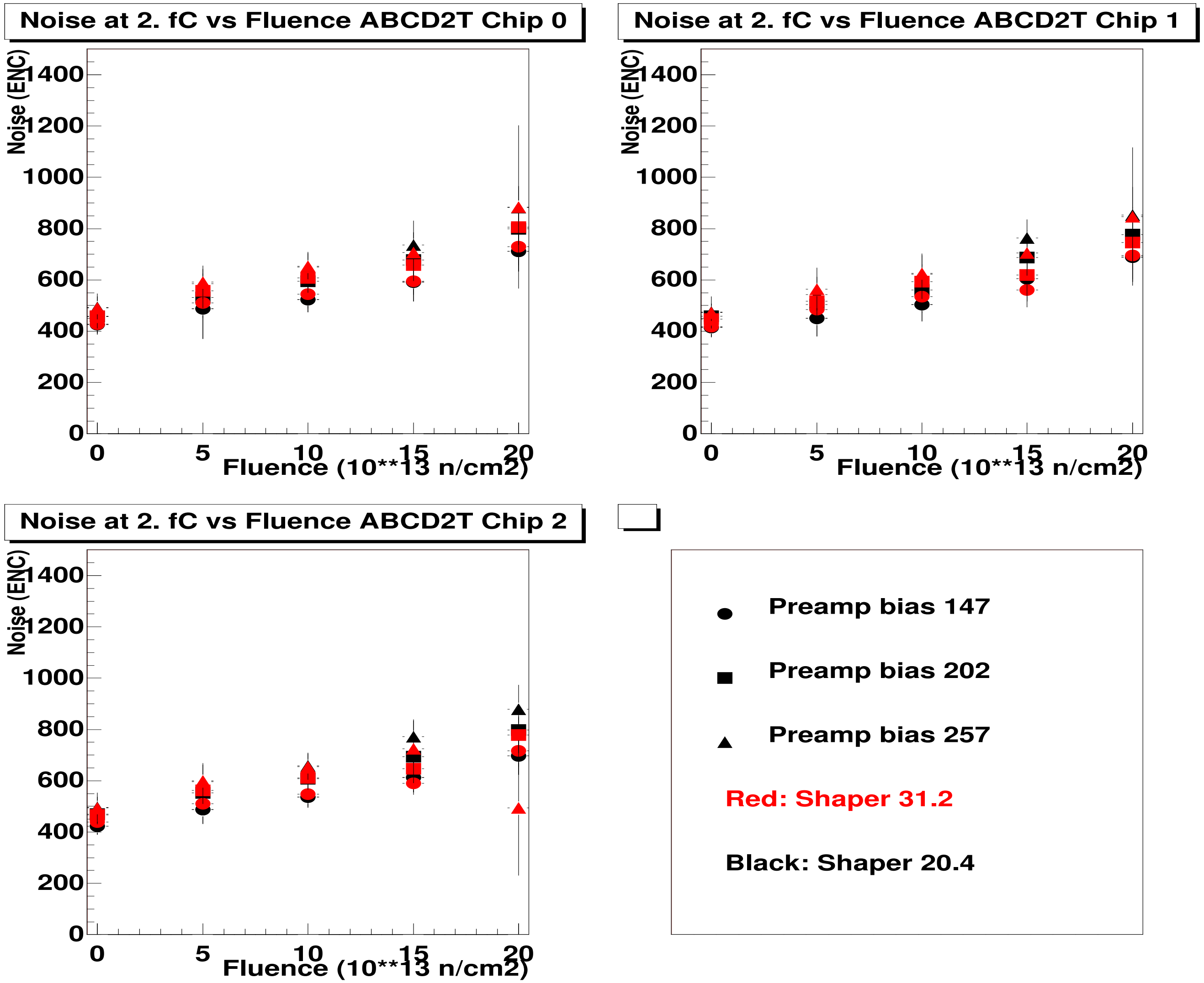


- Noise at 2fC vs channel number
  - Preamp current = 202 uA Shaper current = 31 uA



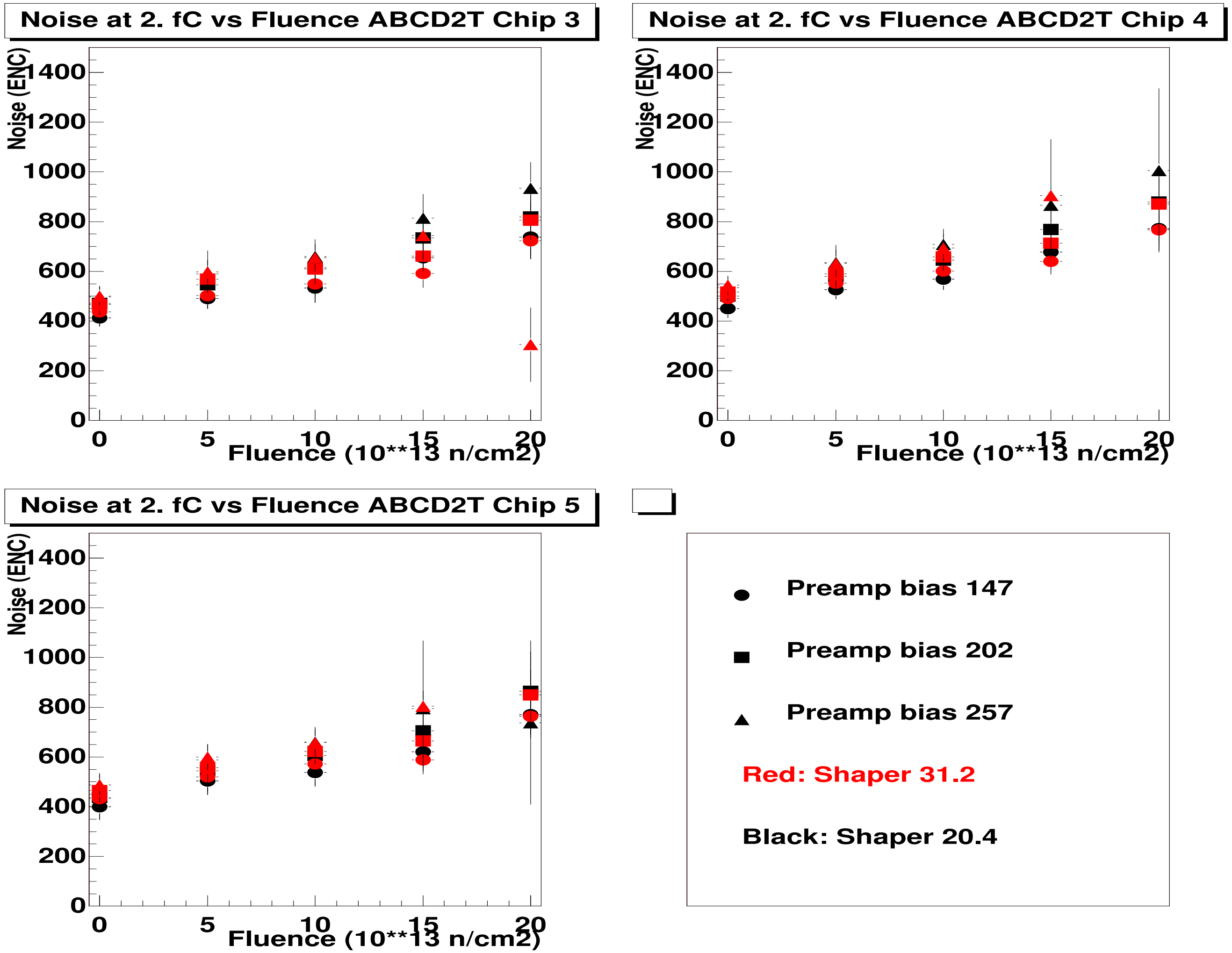
• Noise at 2fC as a function of fluence chips 0-2

(points at Ipreamp = 257 not accurate)



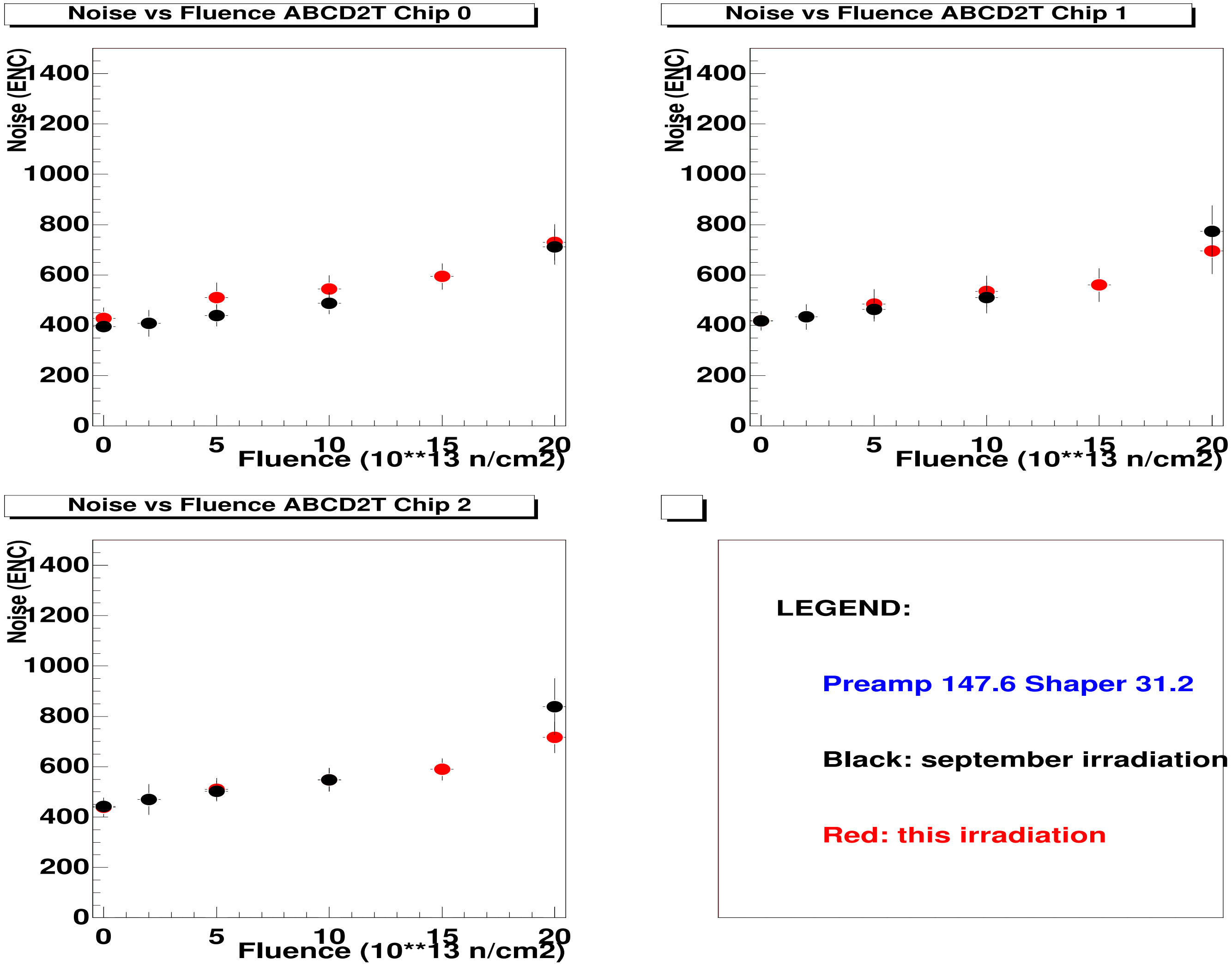
• Noise at 2fC as a function of fluence chips 3-5

(points at Ipreamp = 257 not accurate)

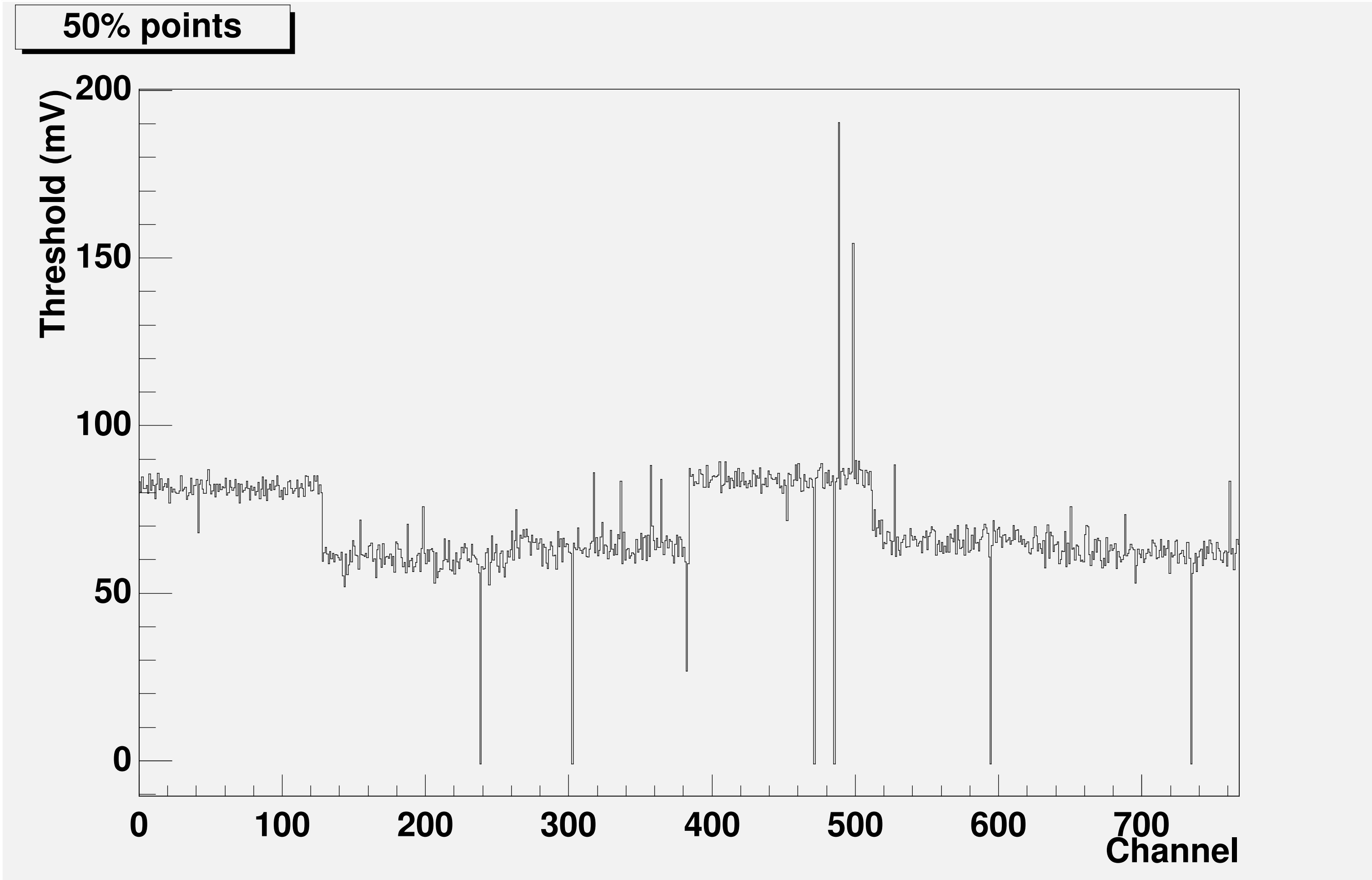


• Comparison with the last (September) irradiation

September: noise at 1.75fC   This irradiation: noise at 2fC

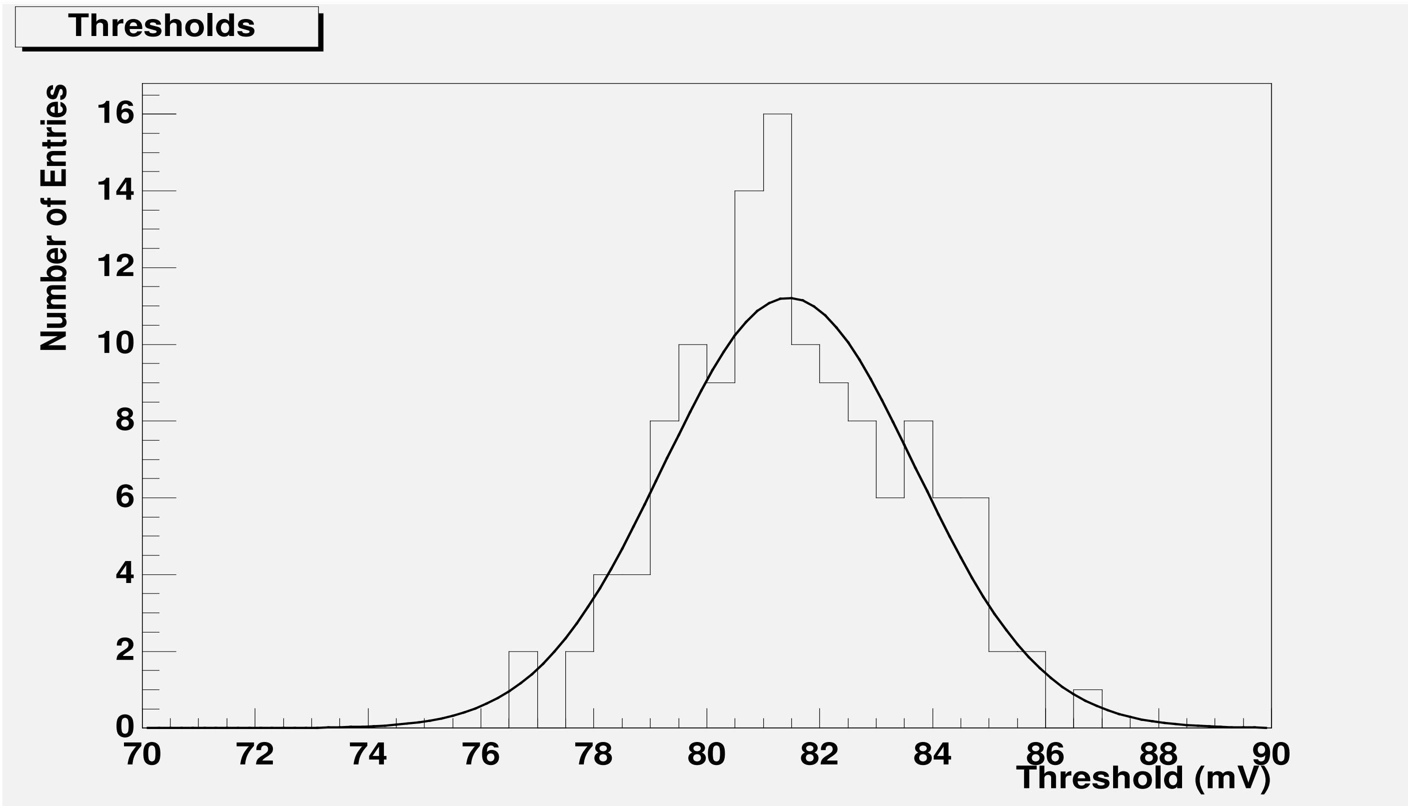


- Trimmed 50% points at 1f C after irradiation with 2×10^{14} n/cm^2
  - Preamp current = 202 uA Shaper current = 31 uA



- Distribution of 50% points for chip 0 at 1 fC after irradiation with 2×10^{14} n/cm^2
  - Preamp current = 202 uA Shaper current = 31 uA

Sigma of the fit = 2.2 mV; Gain = 41.6 mV/fC ⟹ Spread = 0.053 fC



Conclusions:

- chips work after irradiation with 2×10^{14} n/cm^2
- chips performance worse at high preamp (I > 200uA) bias currents
- comparison with September irradiation shows that there is a bit less degradation but:
  we know that fluence at this irradiation was ~10% lower than in September
- gain 42 mV/fC at Ipreamp = 202.4 Ishaper = 31.2
- noise 800 electrons at Ipreamp = 202.4 Ishaper = 31.2
- threshold spread at 1fC is 0.05fC after trimming