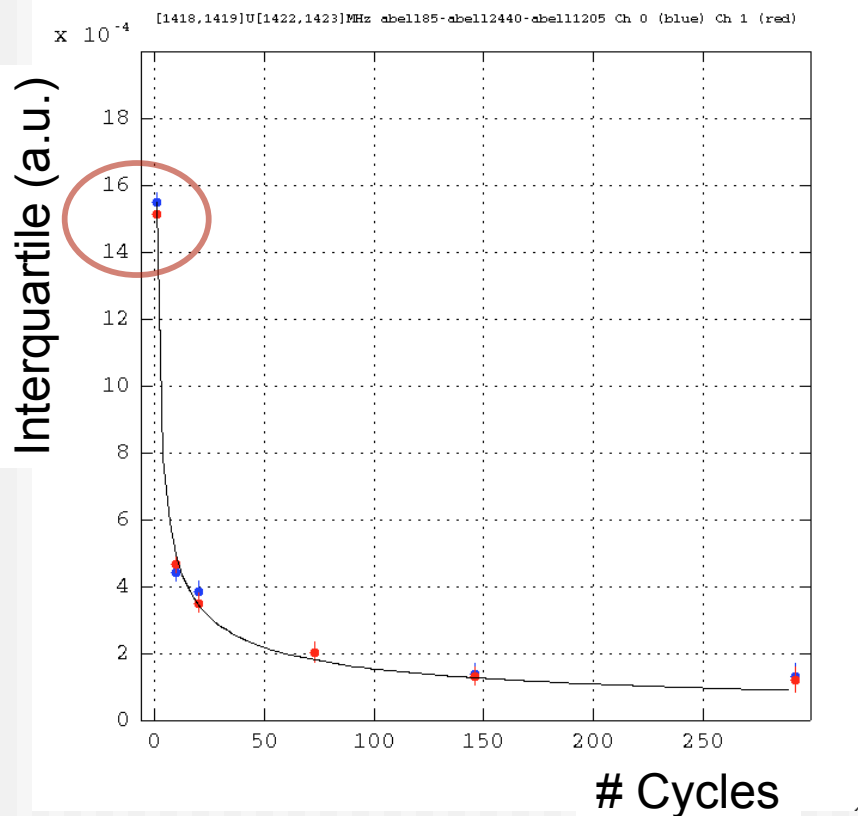# Galaxy cluster analysis: System Sensitivity

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Meudon, 3rd Feb 2012

Always the same noise value…

[1418,1419]U[1422,1423]MHz abell85-abell2440-abell1205 Ch 0 (blue) Ch 1 (red)

x 10^{-4}

Interquartile (a.u.)

\# Cycles

- ~ 14-18×10^{-4} a.u.
- … no matter the frequency band or the number of cycles considered
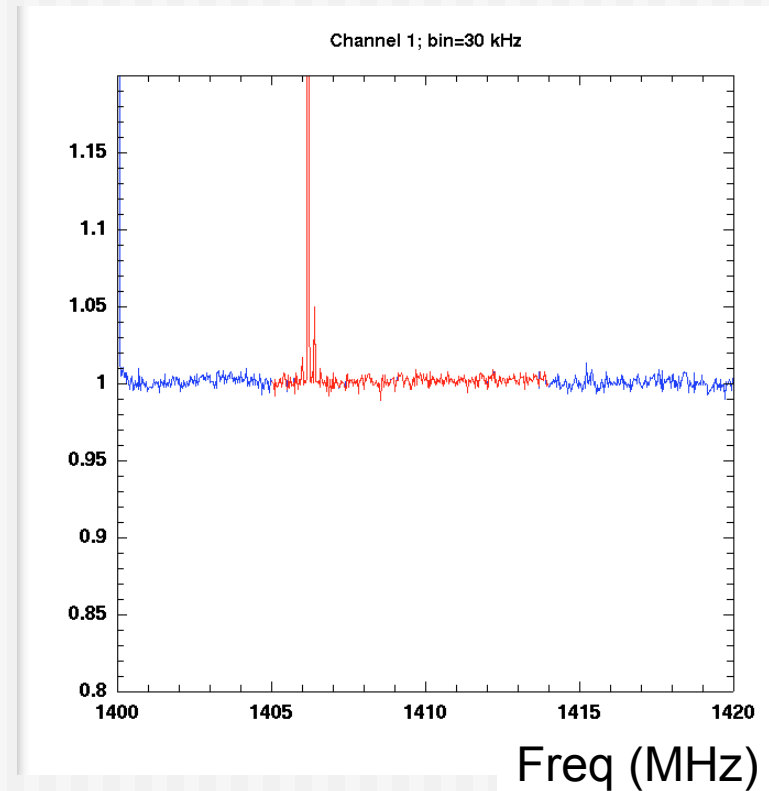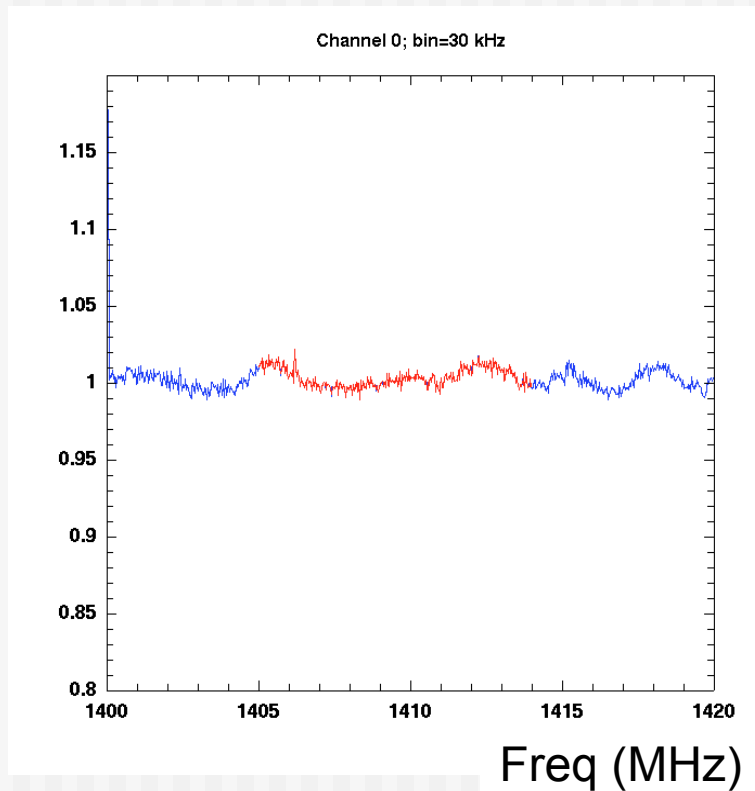- We might be missing some systematic effect…

Noise vs. frequency bin

- We try the other way round, i.e. noise vs. frequency bin
- For a given pair N_{cycles}, $\Delta\nu$, we should find the same value

$$noise \propto \frac{1}{\sqrt{N_{cycles}\,\Delta\upsilon}}$$

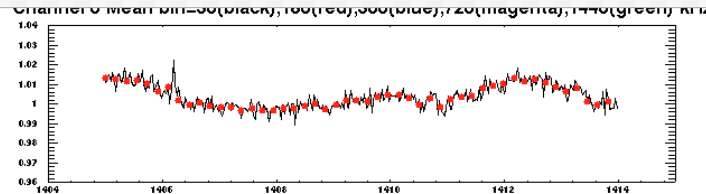- We try first with one ON/g cycle in the band [1405,1414] MHz (= 9 MHz)

Noise vs. frequency bin: ON/Gain

Channel 0; bin=30 kHz

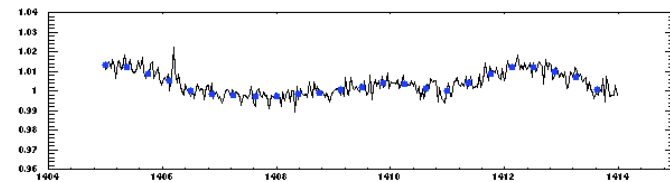Channel 1; bin=30 kHz

Freq (MHz)

Freq (MHz)

- Ch0 oscillates notably. Ch1 presents RFI

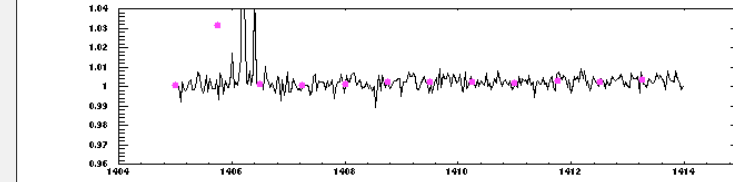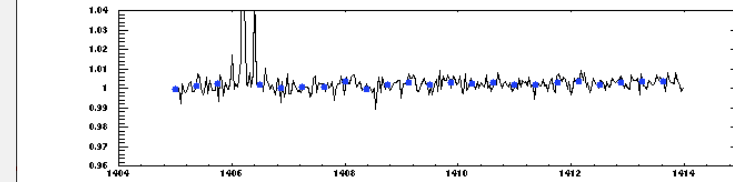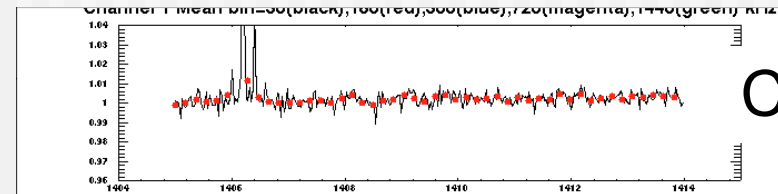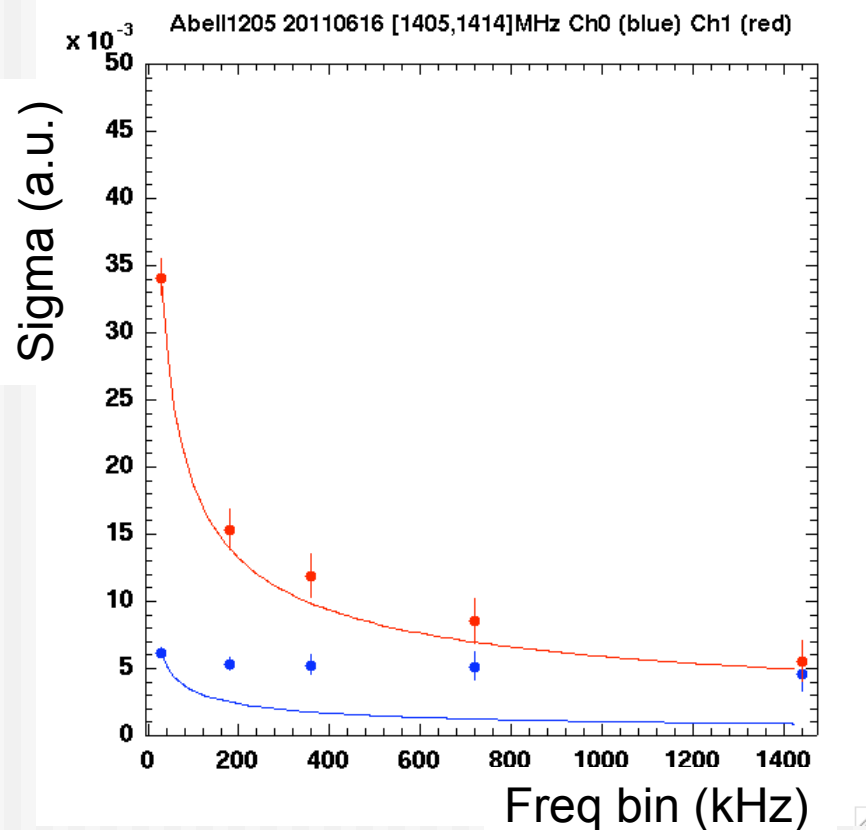# Rebinning in Frequency

180 kHz

360 kHz

720 kHz
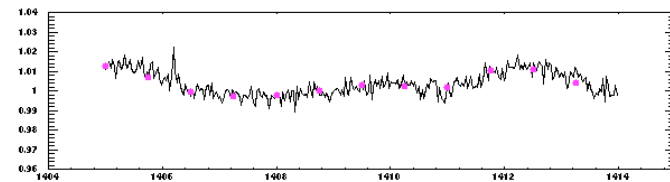
1440 kHz
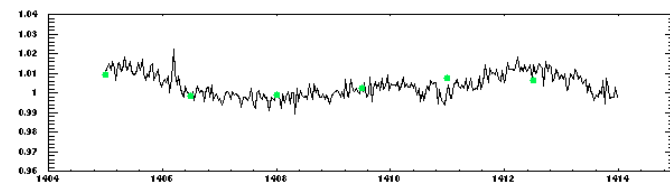
Ch1
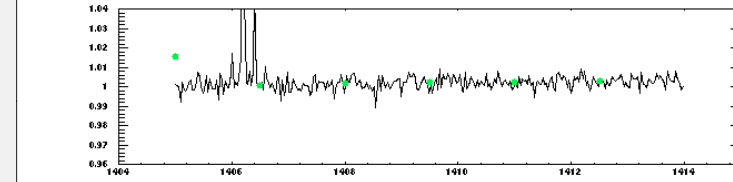
- Ch0 (left): the rebinned values follow the oscillation pattern
- Ch1 (right): the rebinned values are affected by RFI

Noise vs. Freq_bin

Abell1205 20110616 [1405,1414]MHz Ch0 (blue) Ch1 (red)

- Max Freq_bin = 1.4 MHz
- Ch0: sigma value is high and « saturated »

  $\sigma \sim 5 \times 10^{-3}$

- Ch1: sigma value is too high

  $\sigma \sim 5 - 30 \times 10^{-3}$

  but it decreases as expected

- Thus, we use the interquartile

Noise vs. Freq_bin
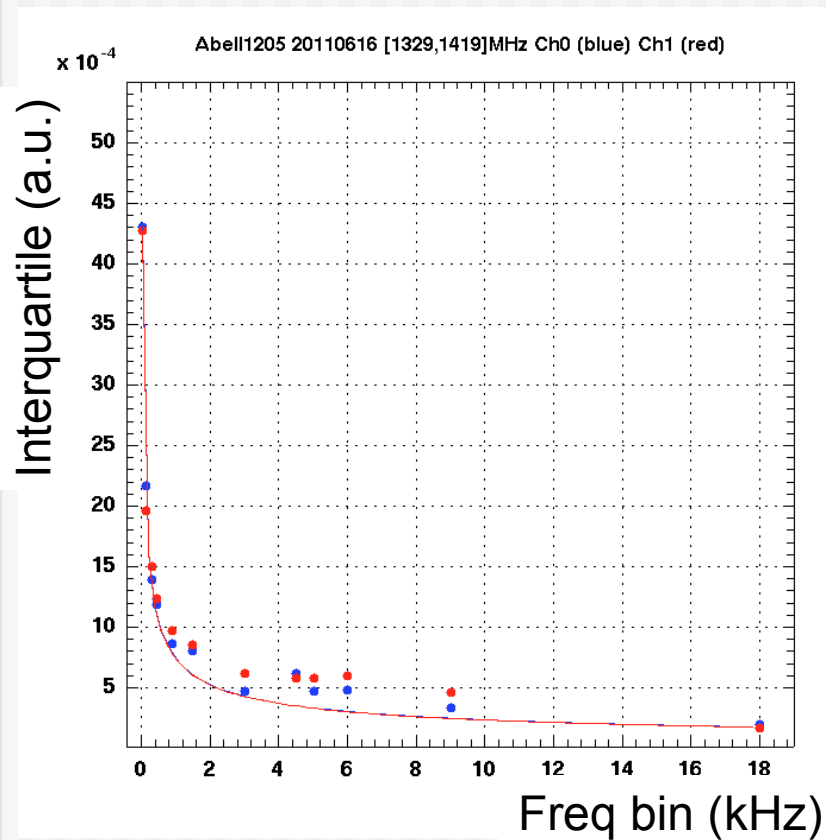
Abell1205 20110616 [1329,1419]MHz Ch0 (blue) Ch1 (red)

- $$\frac{ON/g - OFF/g}{\left(OFF/g\right)_{filt}}$$

- [1329,1419] MHz

- IQR values are coherent with fluctuation amplitudes seen ~10^{-4}

- In freq bins of 3-6 MHz, IQR is « saturated »

$\Rightarrow$ oscillation not completely removed?

Noise vs. Freq_bin
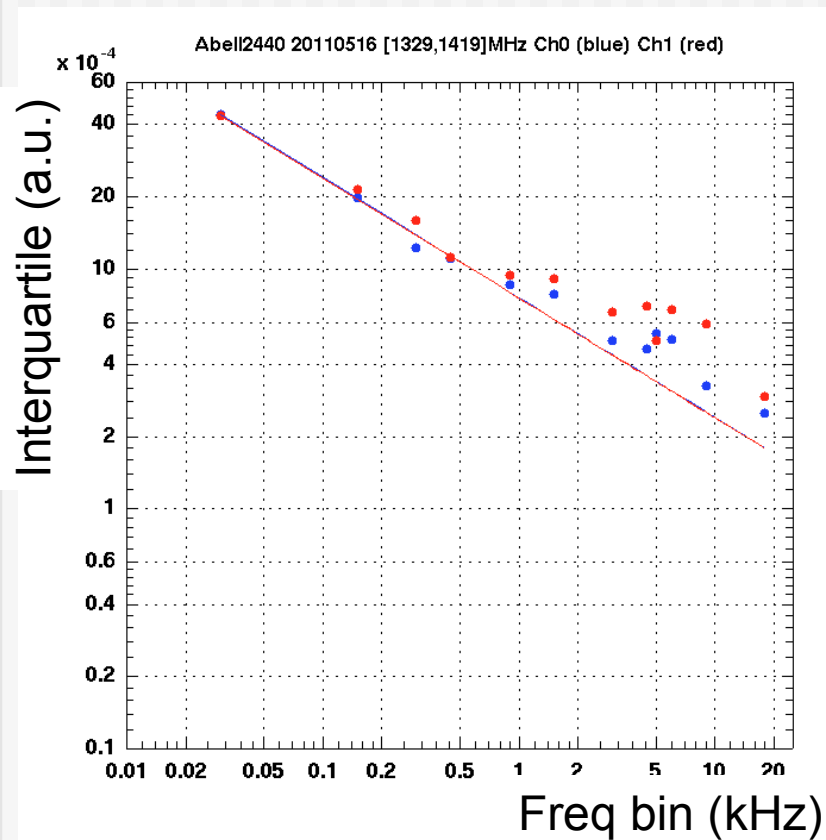
Abell2440 20110516 [1329,1419]MHz Ch0 (blue) Ch1 (red)

- $$\frac{ON/g - OFF/g}{\left(OFF/g\right)_{filt}}$$

- [1329,1419] MHz

- IQR values are coherent with fluctuation amplitudes seen ~10^{-4}

- In freq bins of 3-6 MHz, IQR is « saturated »
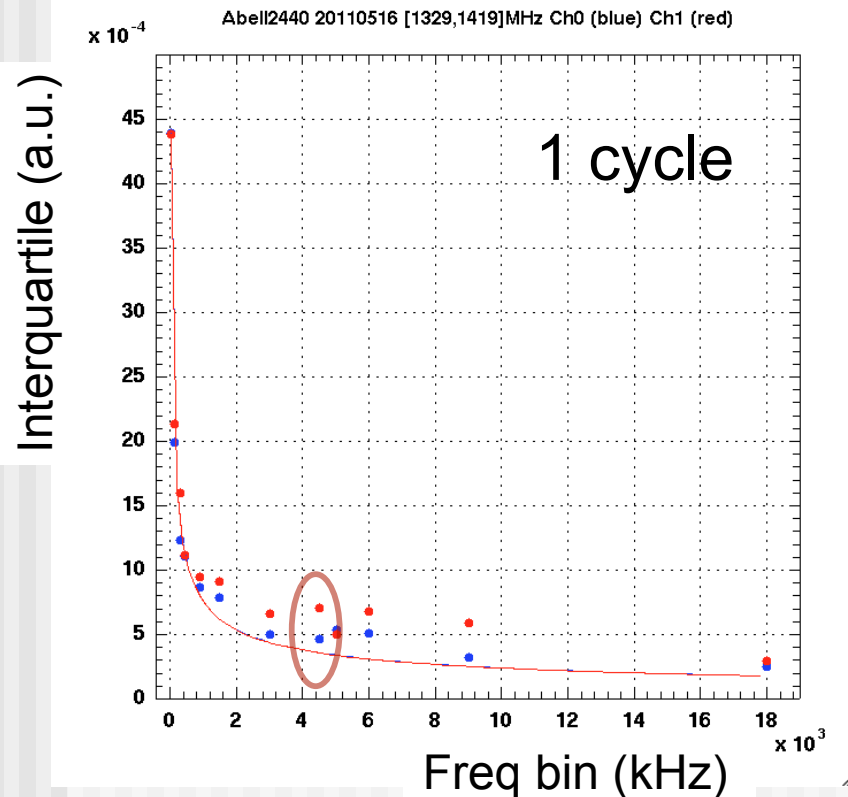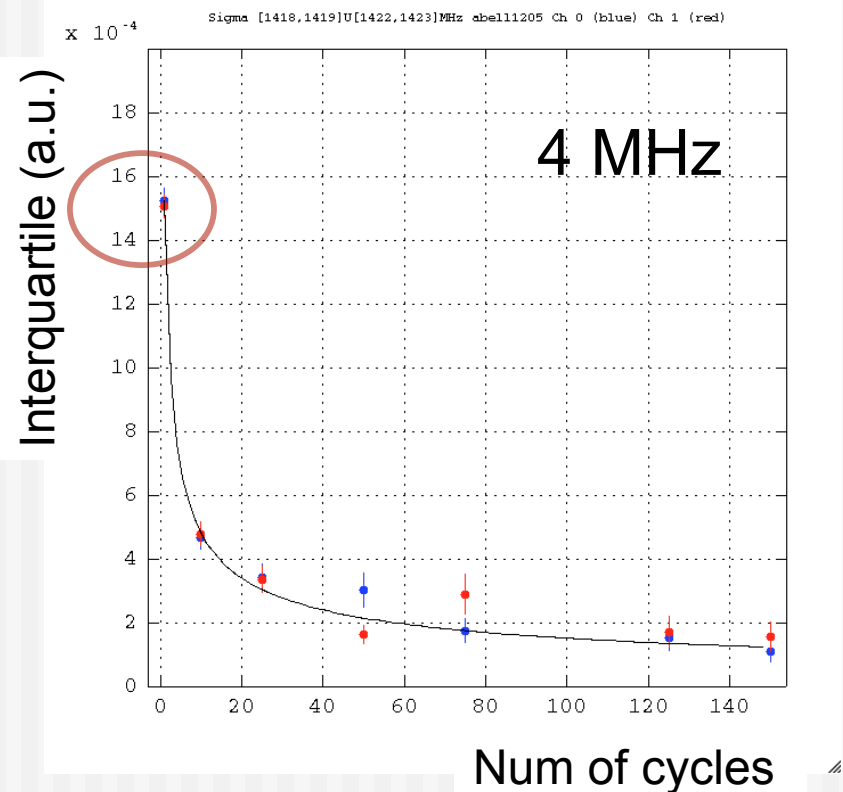
  $\Rightarrow$ oscillation not completely removed?

Comparison Freq_bin vs. N_{cyc}
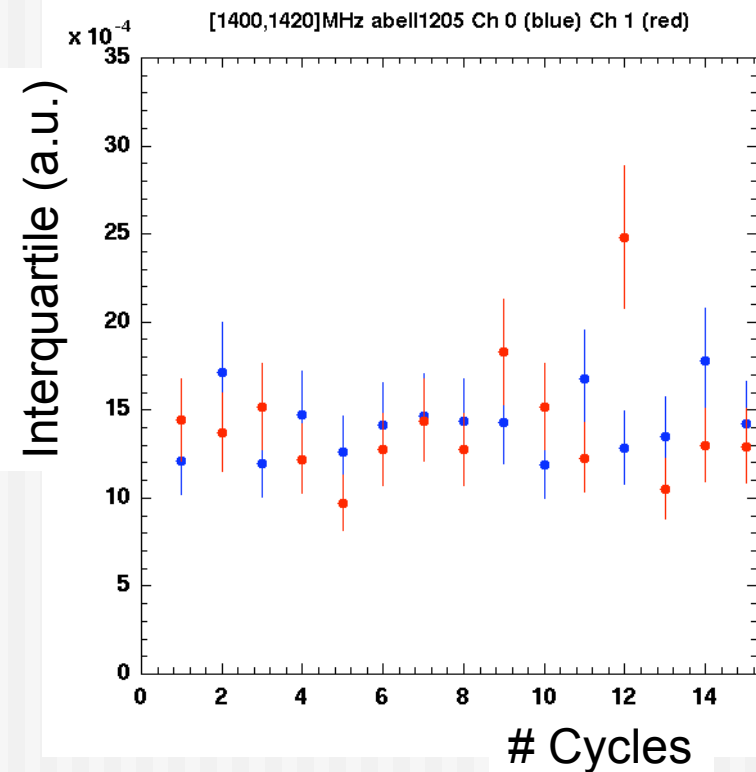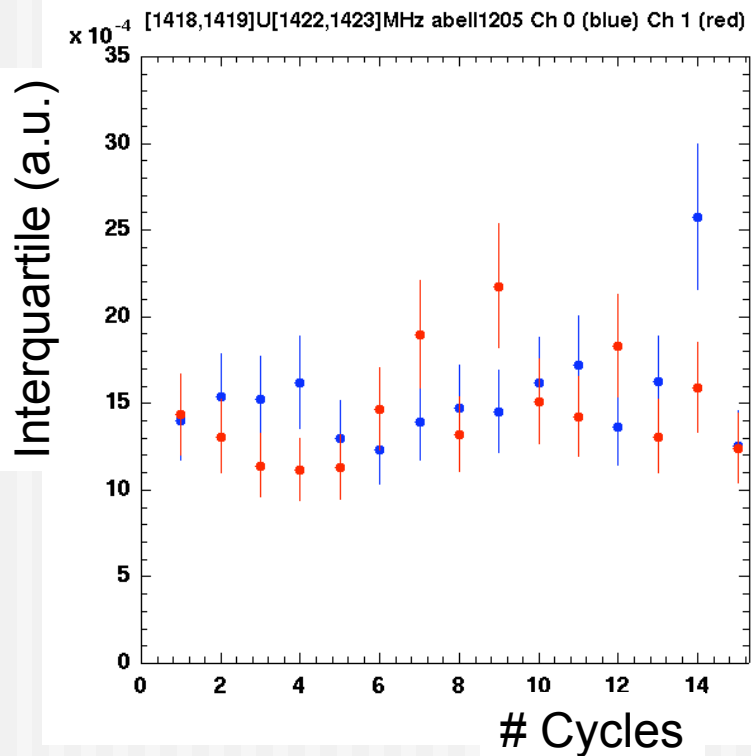

1 cycle

4 MHz

- IQR ~ 5×10^{-4} a.u.
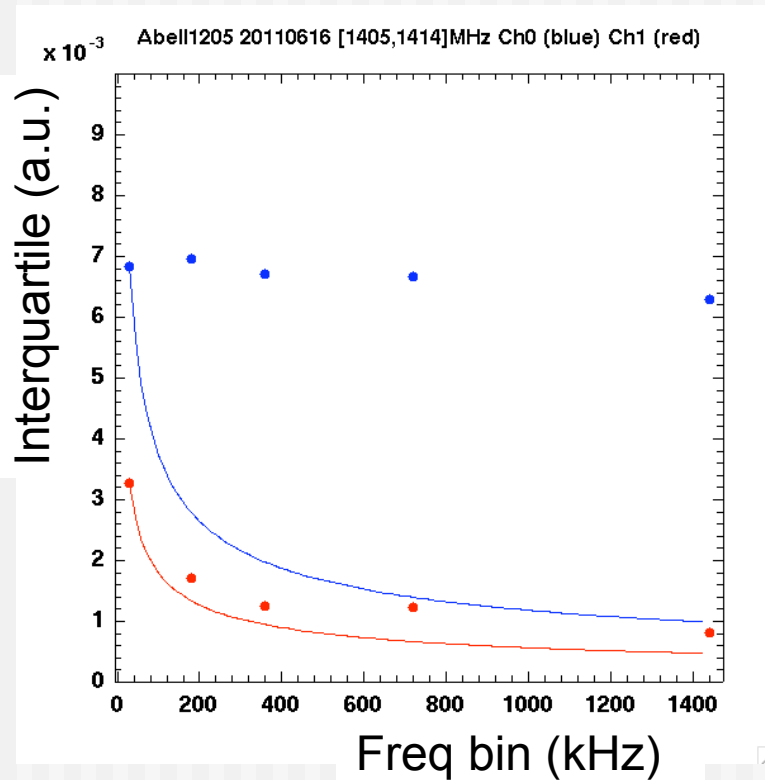
IQR ~ 15×10^{-3} a.u. ??

Work ongoing…

- Looking for the systematics to have better sensitivity (and understand what is going on!!):

    - In the noise vs. Freq_bin the saturation is probably due to remaining oscillation pattern

    - In the noise vs. N_{cycle} it is not clear yet…

        ♦ Maybe it is due to the system evolution from cycle to cycle??

Work ongoing…

- Slices of 50 cycles each

Extra

Abell1205 20110616 [1405,1414]MHz Ch0 (blue) Ch1 (red)

- IQR from ON/g cycle10.