Amas@Nançay Sensitivity vs t_{int}

J.E Campagne

A. S Torrento

11/07/2012

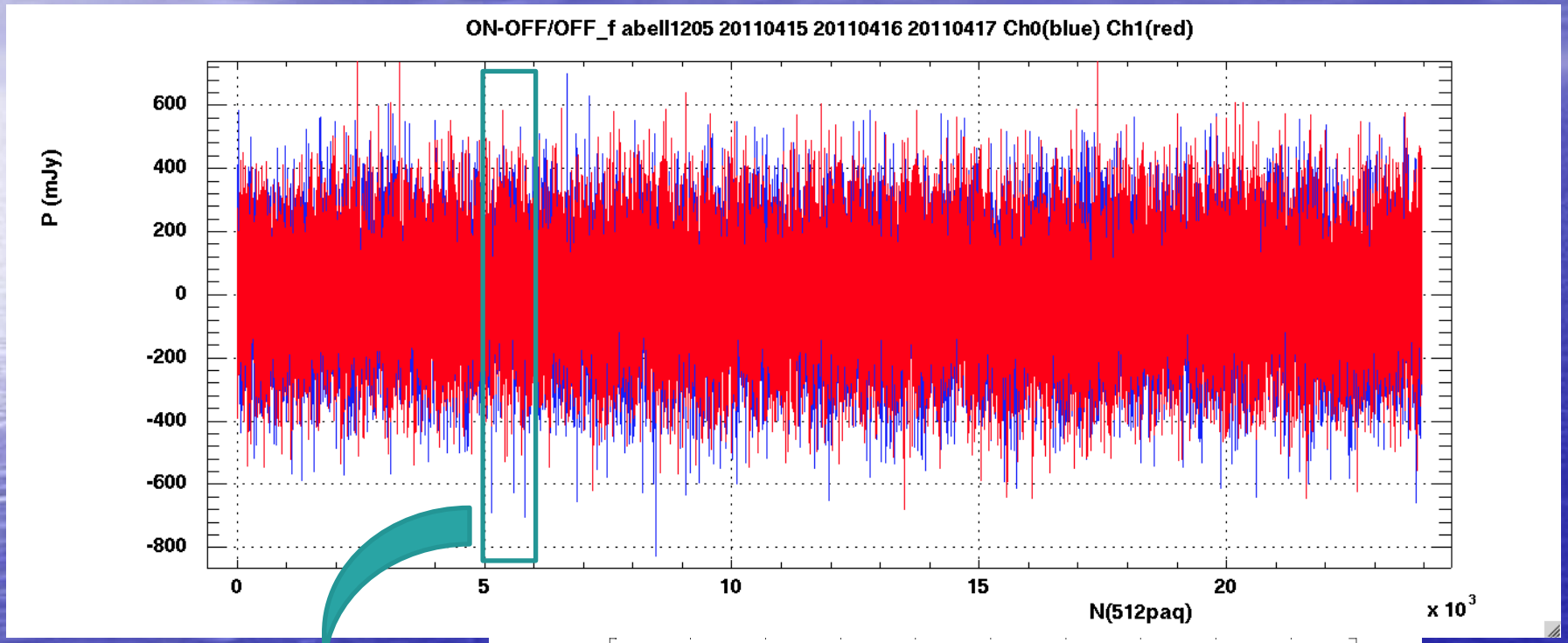
Data sets

- MEMO Nançay/Amas/05.06.12 and
  - we focus on a single cluster (Abell1205) for data homogeneity
  - We have modified the analysis for a set of 3 days to get finer time sampling (confirm previous analysis with std pipeline)
- Data taken with BAOradio DAQ on the fly at Nançay 18/06/12 ~300 sec (tot., or 100sec real) changing the #packets per fits file

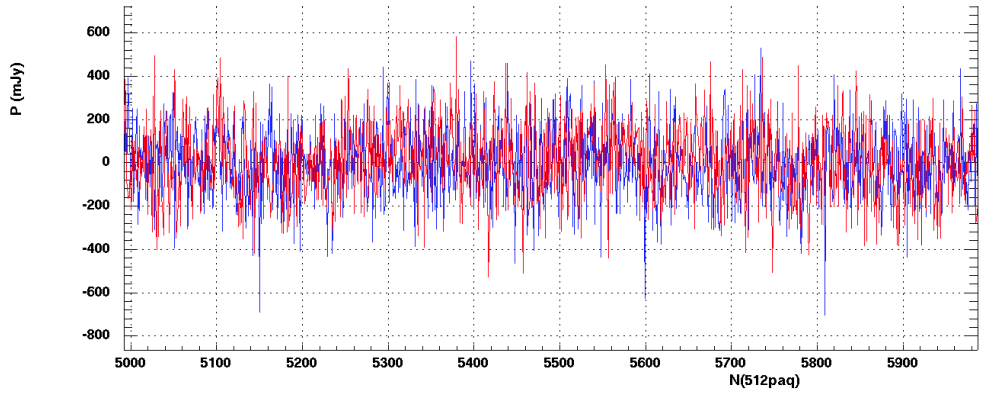
Analysis (brief)

- Use of 512 BAO packets to compute a "time"-median value to perform minimal integration of 0.02sec (real). Notice: std pipeline uses 5120 packets grouped by 5 to get a mean. We have x-checked that the present analysis extends the results of Nançay/Amas/05.06.12.
- $\Delta med_i = (med_i^{ON} - med_i^{OFF})/Filt\_freq(med_i^{OFF})$ with i running over the number of 512paq-medians of the same cycle
- Mean of the Δmed_i over [1412,1413]MHz

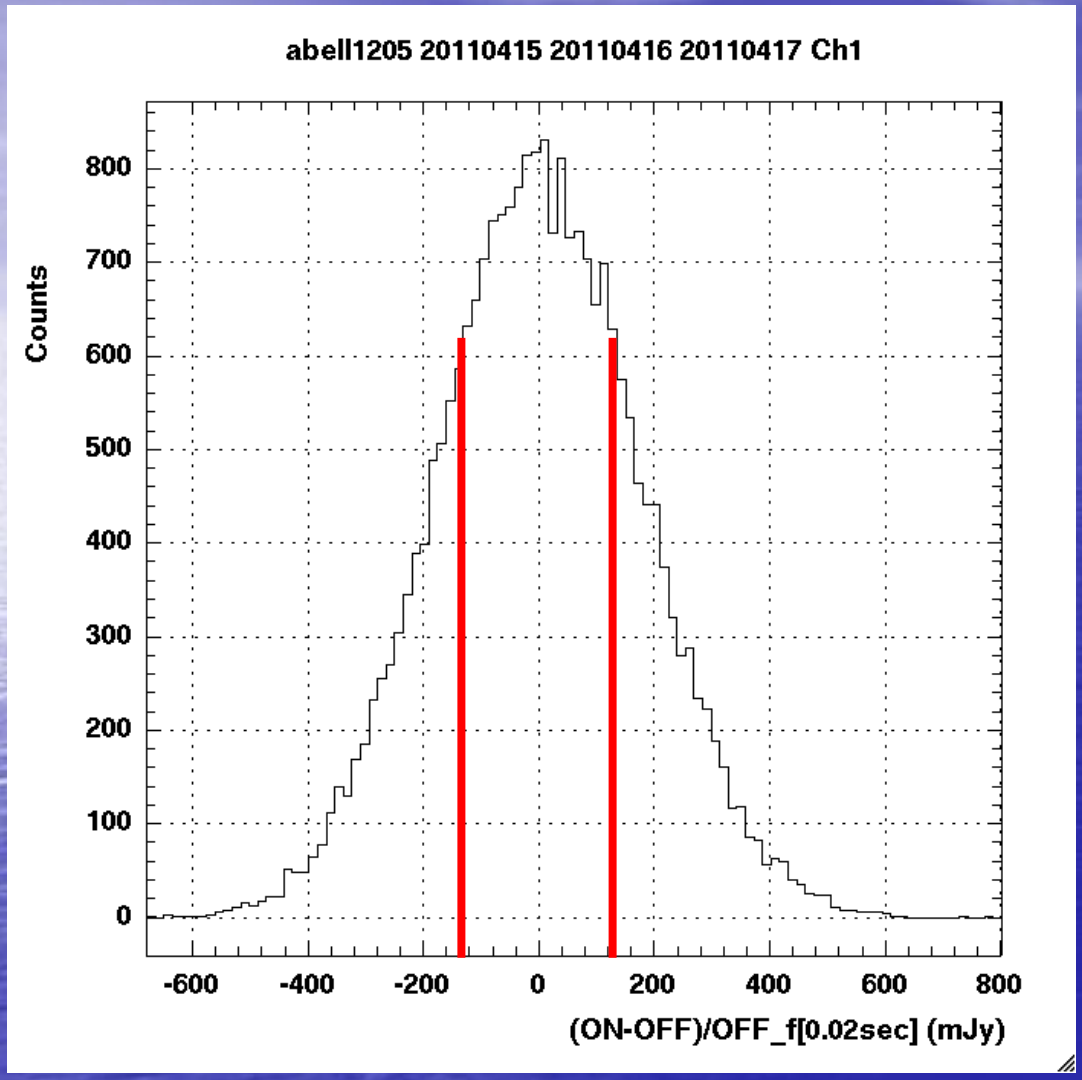
Time sequence $\langle \Delta med_i \rangle_{1MHz}$



Zoom



Use of calibration coeff. 11.3 Jy/au
Nançay/Amas/23.01.12



Determination of the σ of the distribution of the $\langle \Delta med_i \rangle_{1MHz}$ over the whole period

Interquartile Range normalized to Gaussian σ

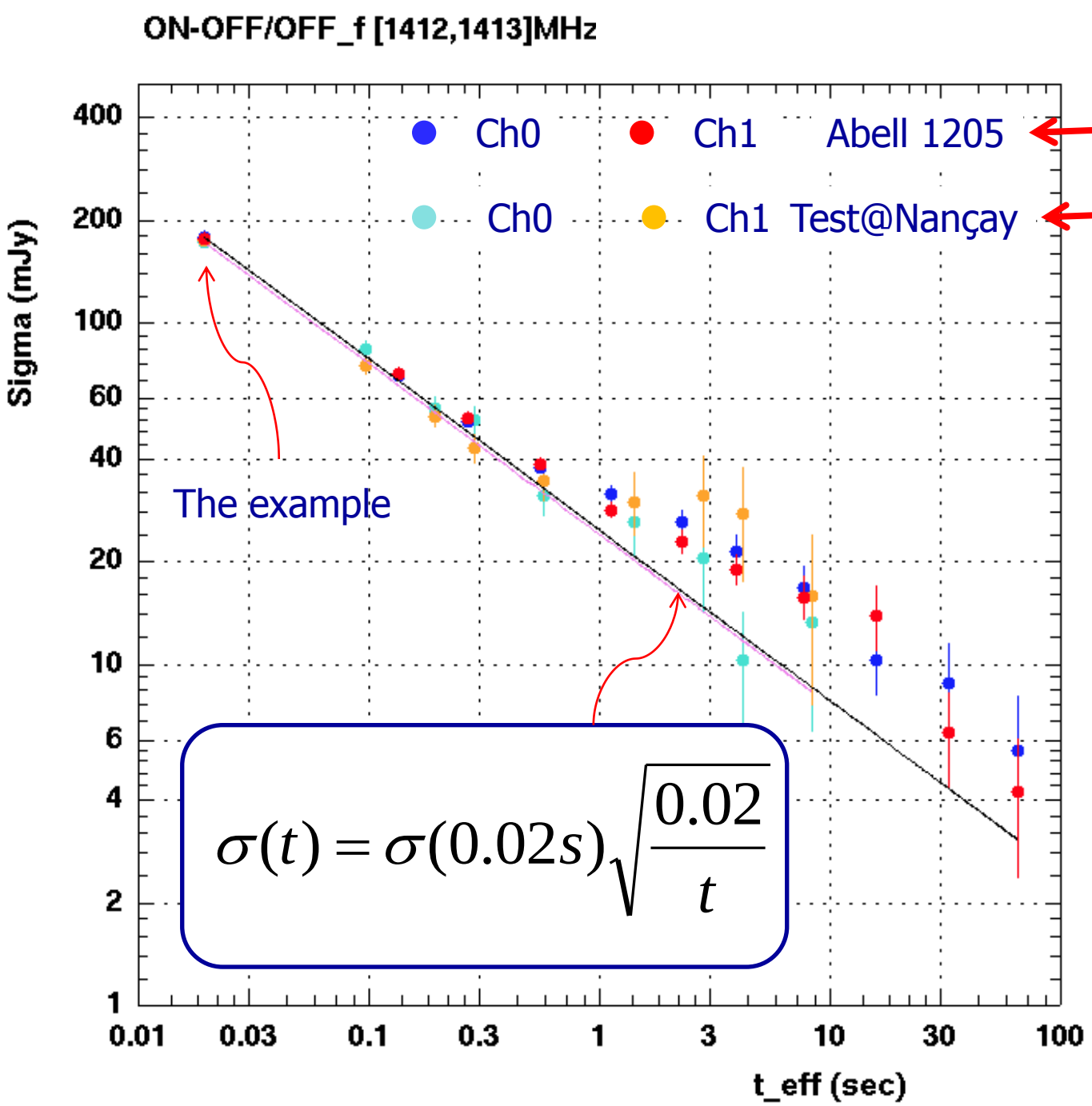
$$\sigma \equiv \frac{Q_3 - Q_1}{1.349}$$

σ versus integration time

- We group the $\langle \Delta \mathrm{med}_i \rangle_{1\mathrm{MHz}}$ to get means over period of time Δt_{int} = nx0.02sec and test the scaling

$$\sigma^{1-polar} = \frac{T_{sys}}{\sqrt{\Delta t_{\mathrm{int}} \Delta \upsilon_{band}}}$$

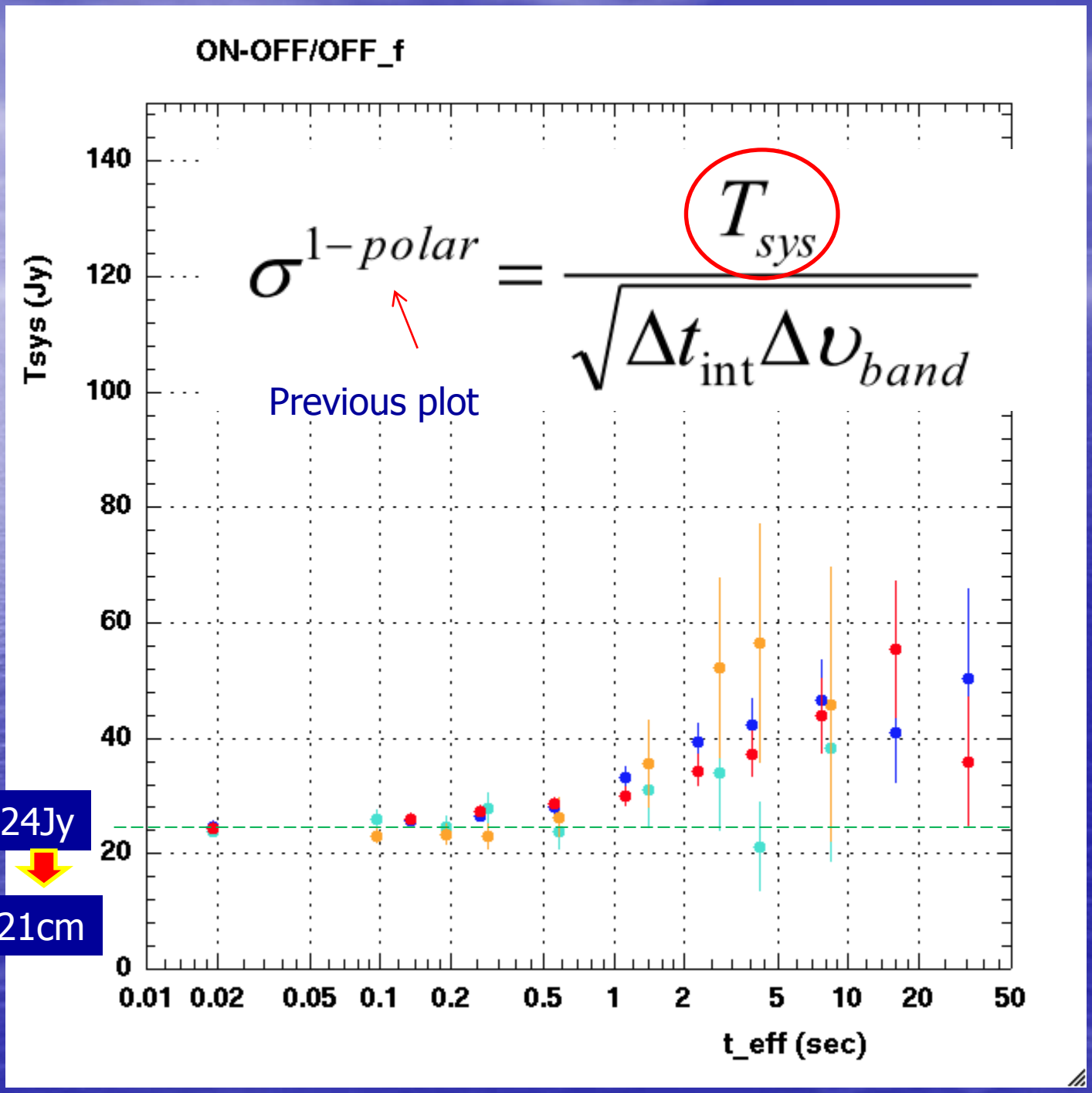
1MHz



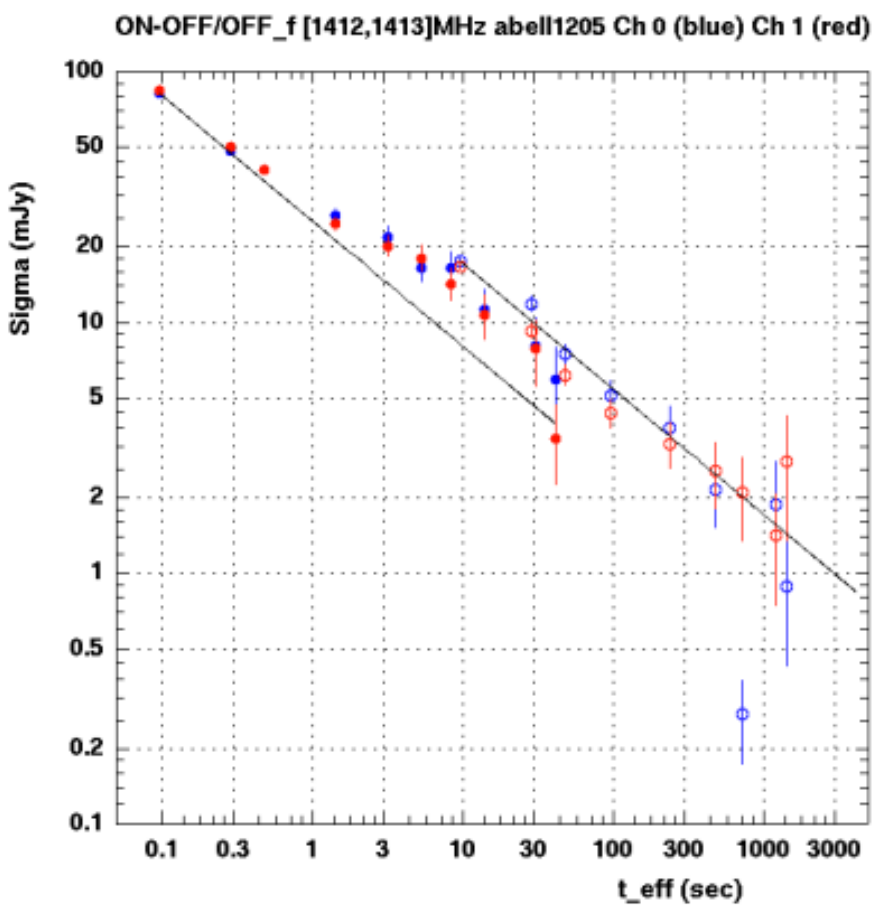
DAQ

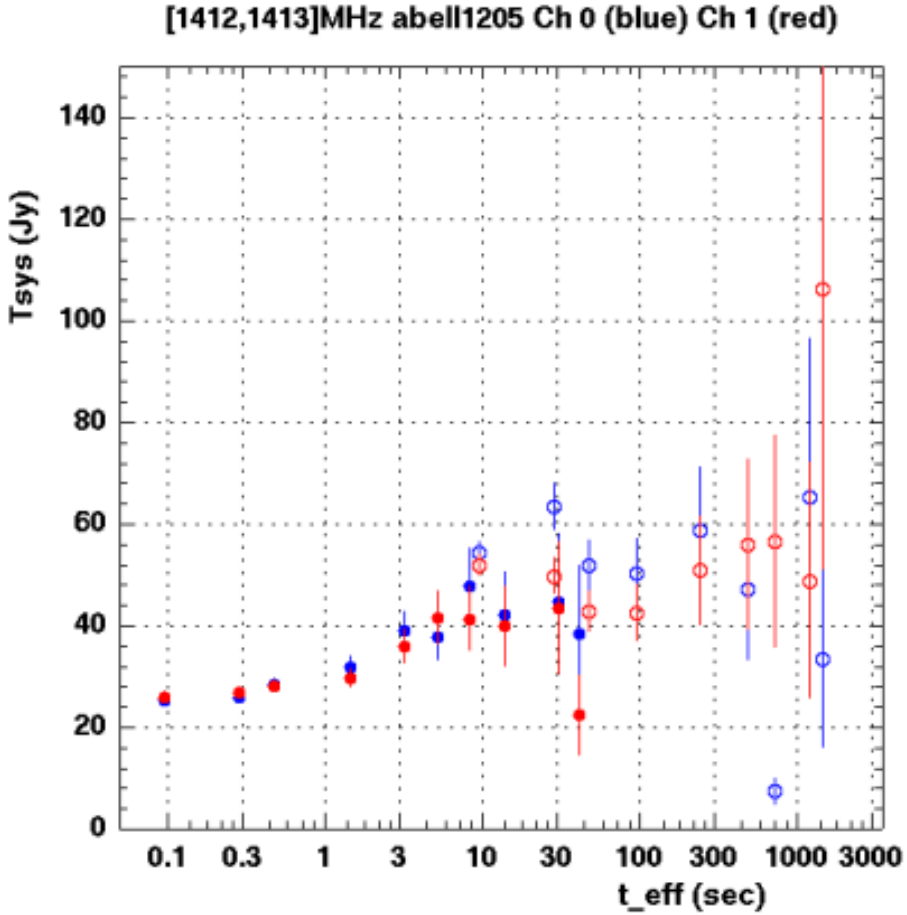
3sec/signal-file

30sec/signal-file


ON-OFF/OFF_f
Tsys (Jy)
140
120
100
80
60
40
20
0
0.01
0.02
0.05
0.1
0.2
0.5
1
2
5
10
20
50
t_eff (sec)
$\sigma^{1-polar} = \frac{T_{sys}}{\sqrt{\Delta t_{\mathrm{int}} \Delta \upsilon_{band}}}$
Previous plot
24Jy
35K@21cm

Analysis with std pipeline and the whole Abell 1205 data extends at longer integration time





Summary

- The sigma exhibits a Gaussian scaling up to $\Delta t_{int} \sim 0.5$ sec
- The Tsys ~24Jy (~35K) in this Gaussian phase is in agreement with NRT continuum confusion RMS @ 21cm
- Breakdown of the scaling unknown. Slope log-log plot (Allan variance plot)

  -1: Gaussian, 0 flicker noise, +1/2 random walk drift, +1 steady drift of measurements