THR software and data products

THR /RPW TEAM: LESIA-Observatoire de Paris

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TNR-HFR Calibrations Software **CALBAR**

- Convert TNR-HFR L1 files to L2R (stand-alone calibration) and L2S (system level calibration)
- CALBAR reads L1 CDFs files and derives output L2 CDFs files.

Input datasets

- ROC-SGSE_L1_RPW-TNR-SURV_V02
- ROC-SGSE_L1_RPW-HFR-SURV_V02

Output datasets

- ROC-SGSE_L2R_RPW-TNR-SURV_V02
- ROC-SGSE_L2S_RPW-TNR-SURV_V02
- ROC-SGSE_L2R_RPW-HFR-SURV_V02
- ROC-SGSE_L2S_RPW-HFR-SURV_V02

- Written in IDL
- wrapper script for execution by ROC framework (tested)

- Calibration parameters (system level or stand-alone calibration) are provided by CDFs files

THR receivers: electric and magnetic power spectral densities.

Analog Part:
Variable gain ***AGC*** (Automatic Gain Control):

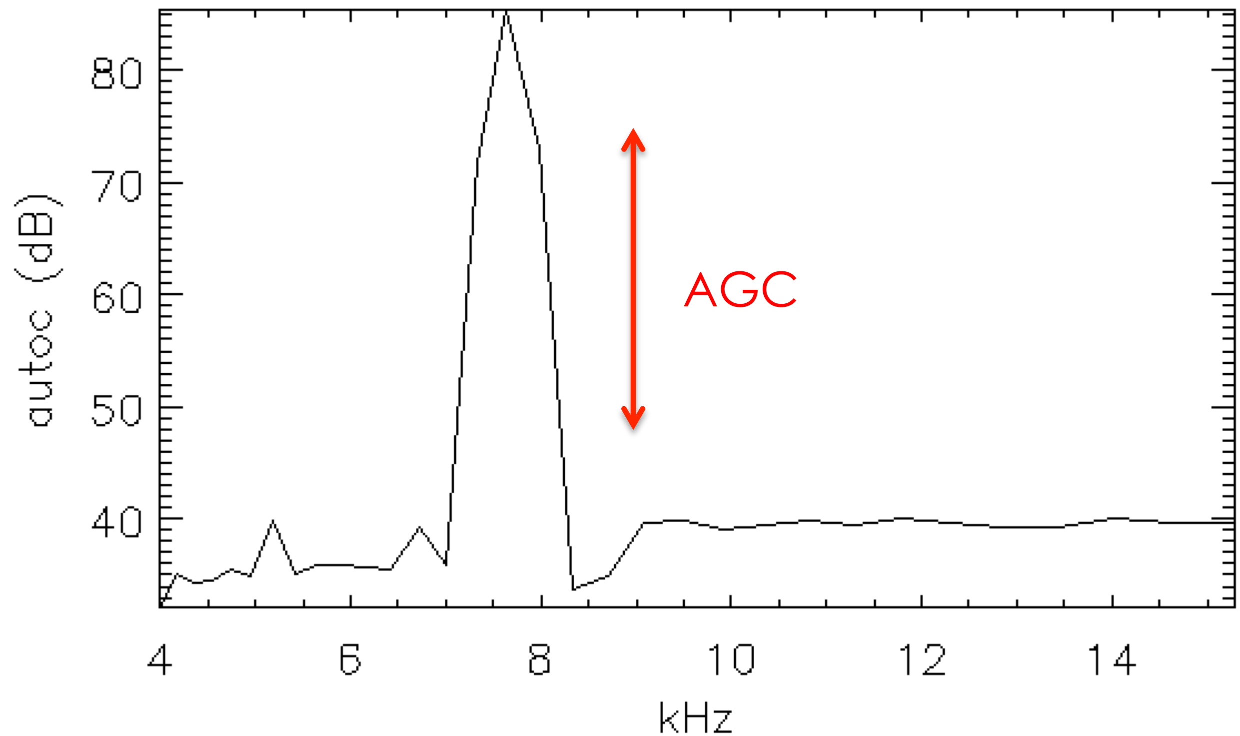
- amplify the signal up to a constant level: a way to measure the signal with an accuracy independent of the input level.

Digital Part:
The input voltage is digitized to know the instantaneous gain as a function of frequency (**Autocorrelations**).

TNR: spectra in 4 frequency band (32 log-spaced frequencies per band) 4 kHz - 1MHz	HFR: Sweeping receiver (NO autocorrelations) 500 kHz - 16MHz

Autocorr from a sinusoidal signal of fixed amplitude

The AGC defines the correct value of the amplitude

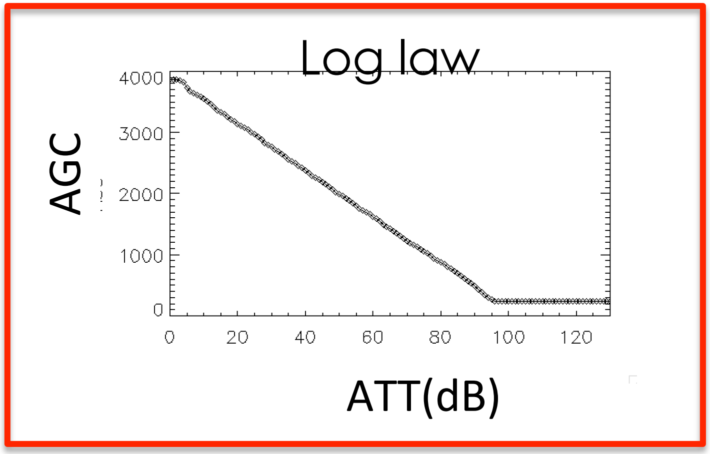


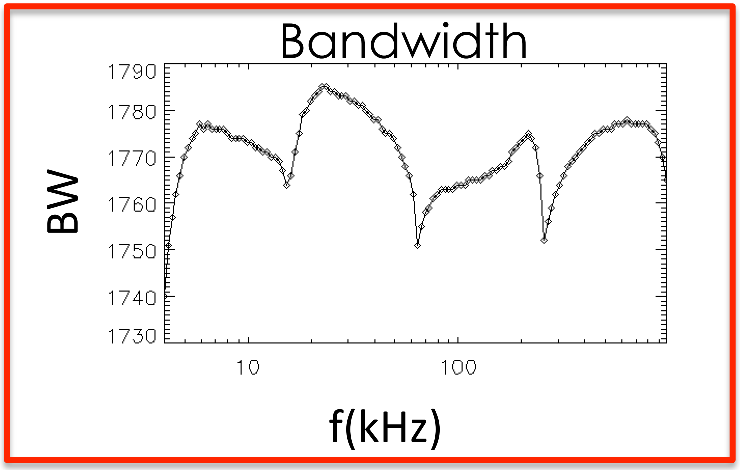
CALBAR corrects for instrumental response (amplitude, frequency and temperature) and combine together information from analog and digital part to retrieve the measured signal in physical units

TNR Calibration procedure

retrieve the input signal by merging AGC and autocorr, and by considering the frequency response

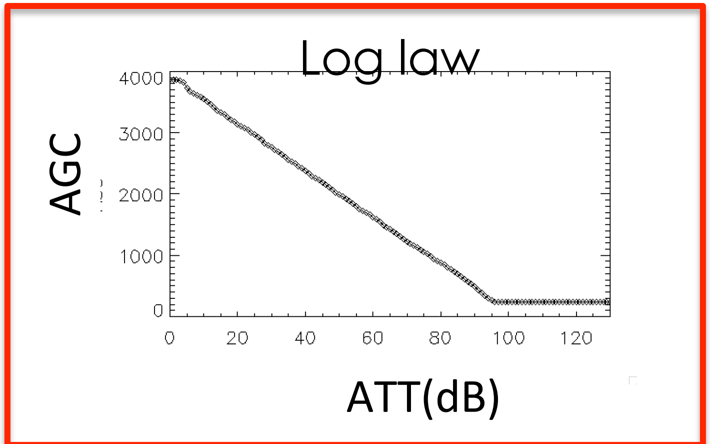
$$dB(V/\sqrt{Hz}) = ATT(AGC) + autos(f) - BW(f) - \langle autos \rangle + dBV_0(V/\sqrt{Hz})$$

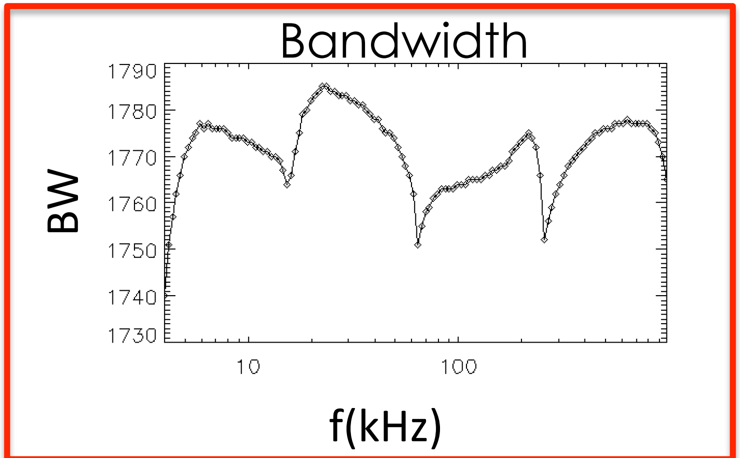




HFR Calibration procedure

$$dB(V/\sqrt{Hz}) = ATT(AGC) + au\ldots s(f) - BW(f) - \langle au\ldots s\rangle + dBV_0(V/\sqrt{Hz})$$





CALIBRATION S/W: STATUS AND PLAN

- Calibration performed with stand-alone parameters (L1 → L2R) implemented and tested on measured signals (white noise + cosine oscillations) injected in lab
- Calibration procedure tested on data from EM during the blank–test Toulouse (April 2016, ambient temperature only): amplitudes and frequency of the injected mysterious signals are recovered

- Procedure for the phase calibration (written but not tested)
- Derivation of the calibration parameters as a function of the temperature from the system-level calibration (Meudon-December 2016)

- Include effect due to the system level configuration (e.g. additional cables for calibration)
- PFM - SCM data calibration with TNR-HFR to be implemented