

International Meteor Conference

Bollmannsruh, Germany

3–6 October 2019

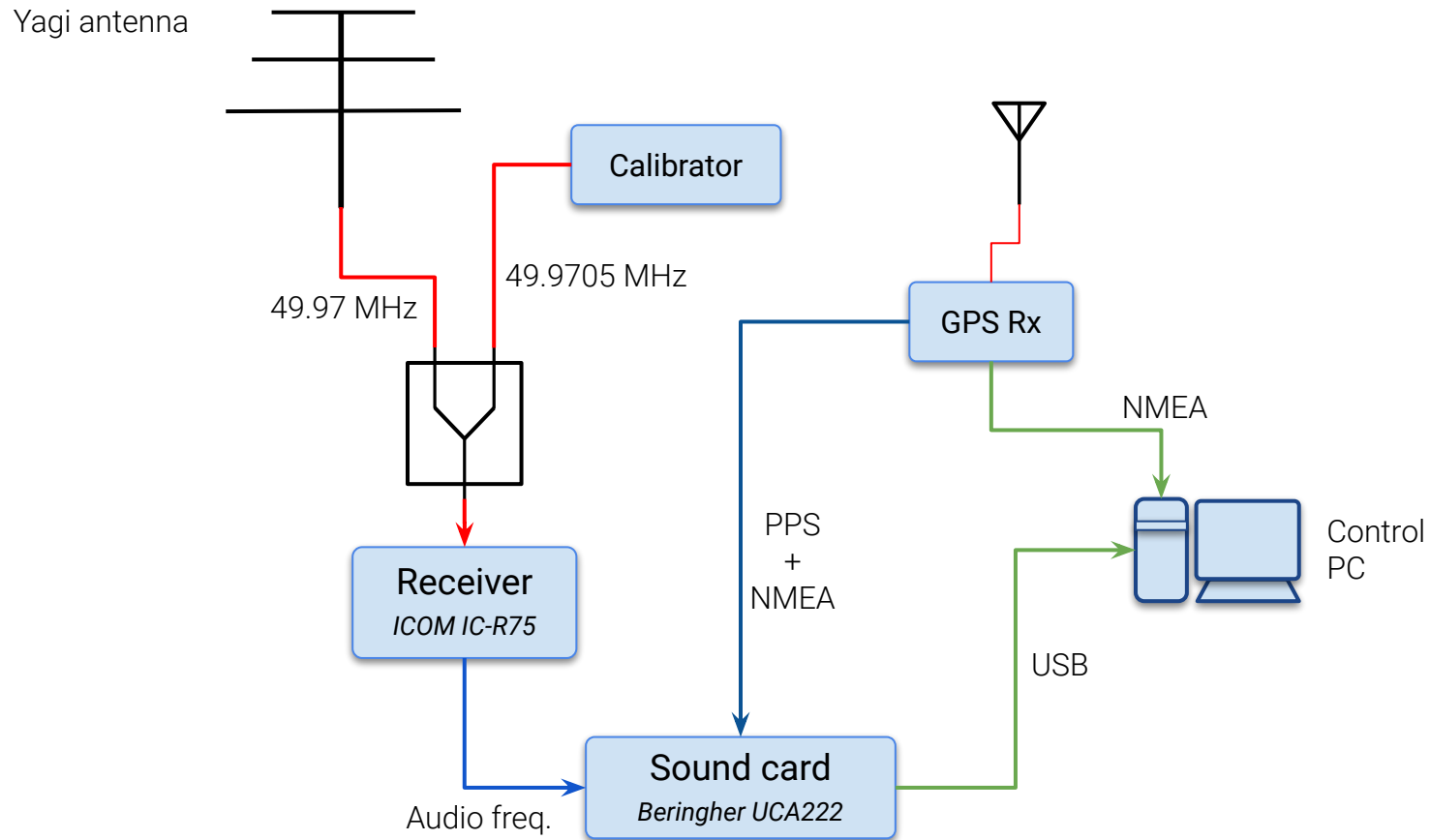


The BRAMS receiving station V2.0

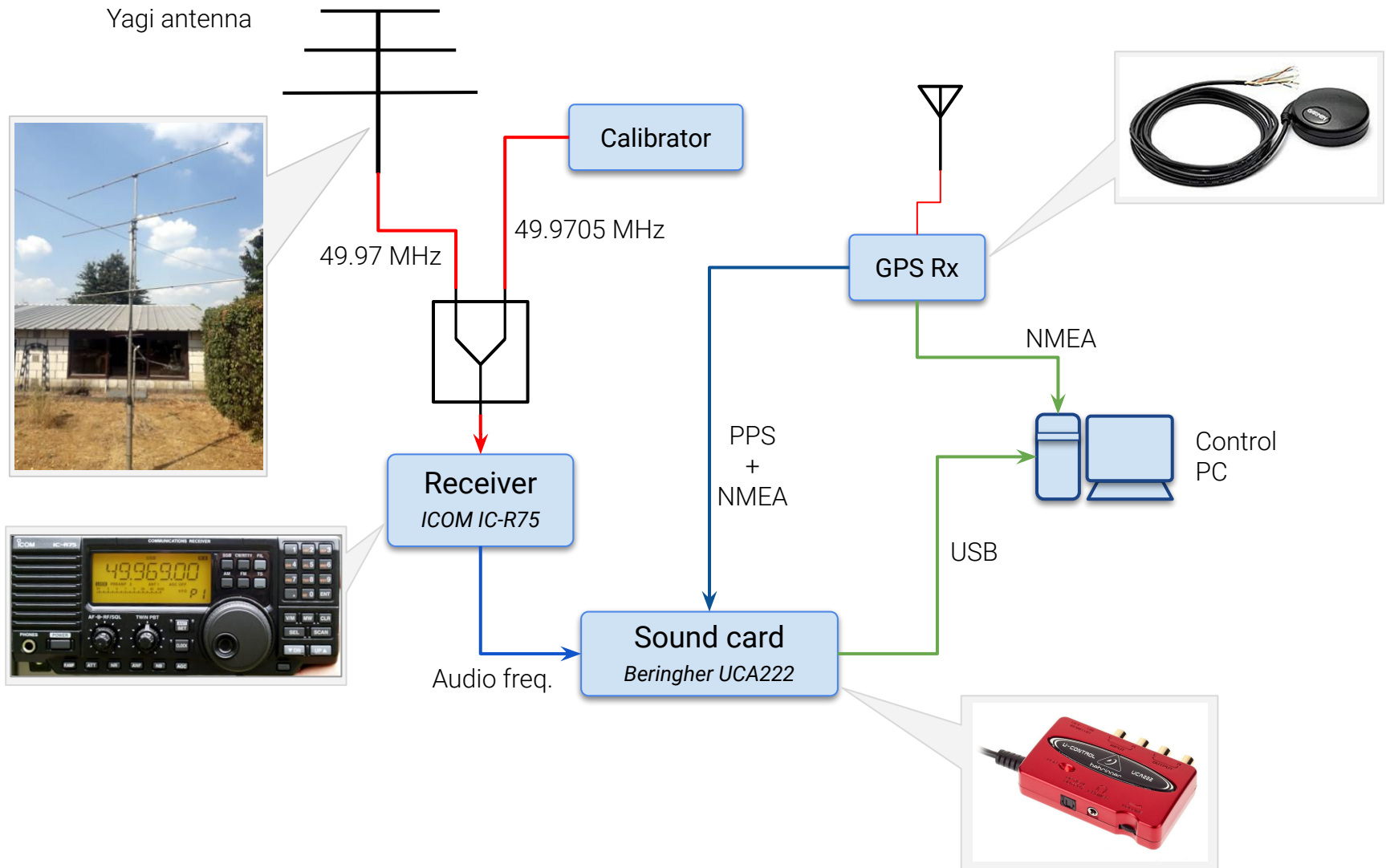
Michel Anciaux, Hervé Lamy, Antonio Martínez Picar,
Sylvain Ranvier, Stijn Calders, and Cis Verbeeck



Current BRAMS basic station



Current BRAMS basic station



Current BRAMS station – Rx Issues



Reliability

- Ageing: several years of continuous operation
- Many have already failed!
- New types of degradation already observed
- This can only get worse!

Current BRAMS station – Rx Issues



Availability

- No longer produced
- Alternative analogue Rx are more expensive
- Market trend → software defined radio (SDR)

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Performance Limitations

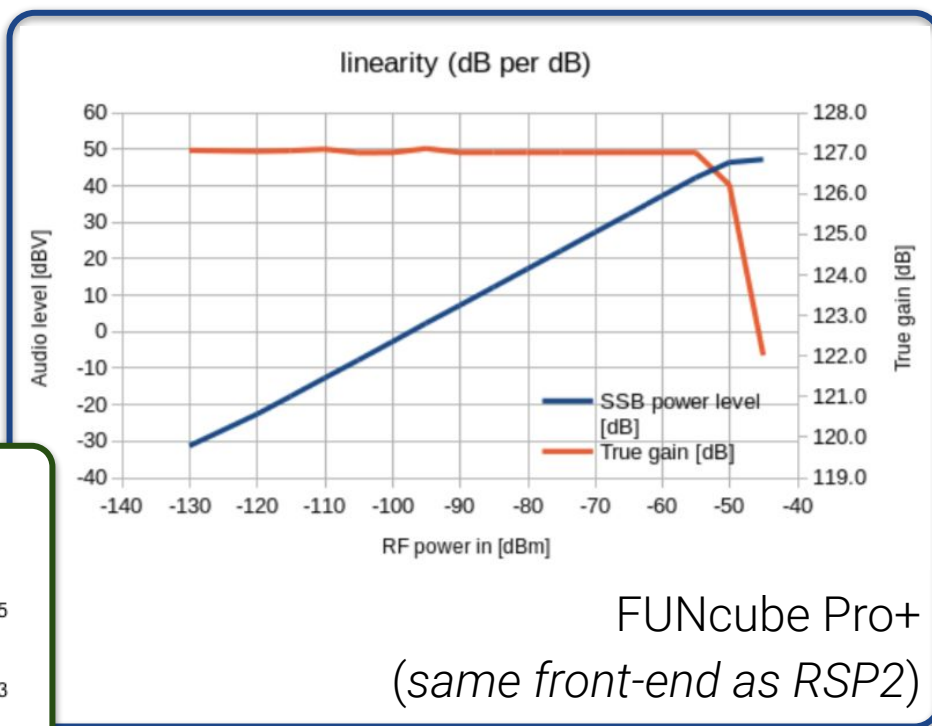
- Limited dynamic range
 - 36 dB • P1dB = -102 dBm • ENOB = 6.0
- Noise temperature ≈ 1000 K
- Frequency instability:
 - LO dependent on temperature (10 Hz/°C)
 - LO cannot be locked to a reference

New Receiver: SDRplay RSP2

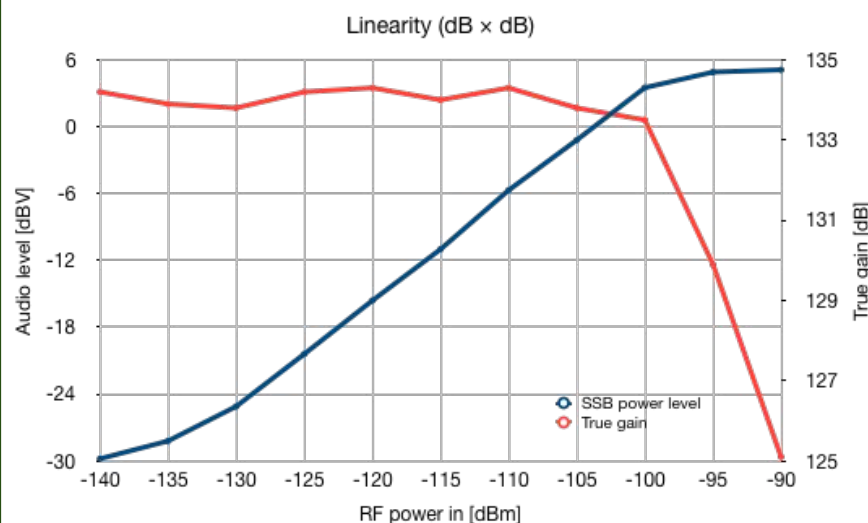
- Range: 1 kHz – 2 GHz
- Bandwidth: 10 MHz
- 3 inputs ($2 \times 50 \Omega + 1 \times \text{High-Z}$)
- Cost < 200€
- Reference Clock I/O
- Noise temperature 320 K (SSB)
- Same front-end as FUNcube Pro+



Linearity & Dynamic Range



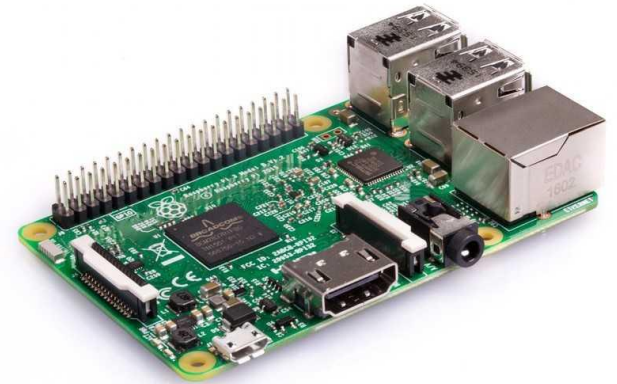
ICOM IC-R75



New Acquisition/Control: Raspberry Pi 3B

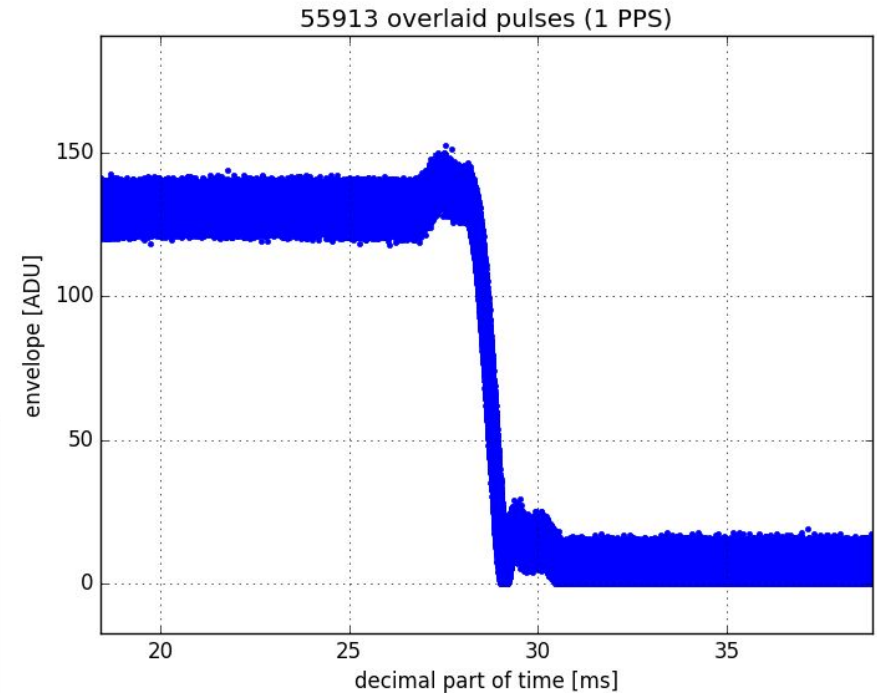
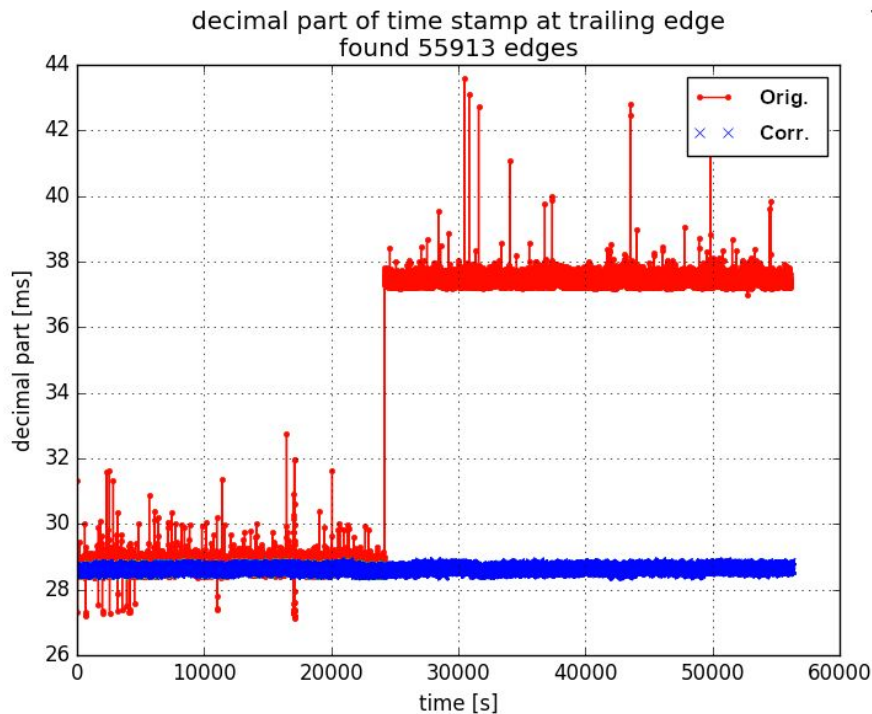
The software has the following characteristics:

- Multithreaded program written in C
- Read I/Q data over USB
- External reference (24 MHz) → No frequency drift
- Decimates the data – resulting sampling rate: 6048 Samples/s
- Detects the upper side band (bandwidth: 2700 Hz)
- WAV files of 300-second + time stamps : current BRAMS format
- NTPD configured to synchronise the system clock to the GPS signal
- Data transfer via *Hamashi VPN*



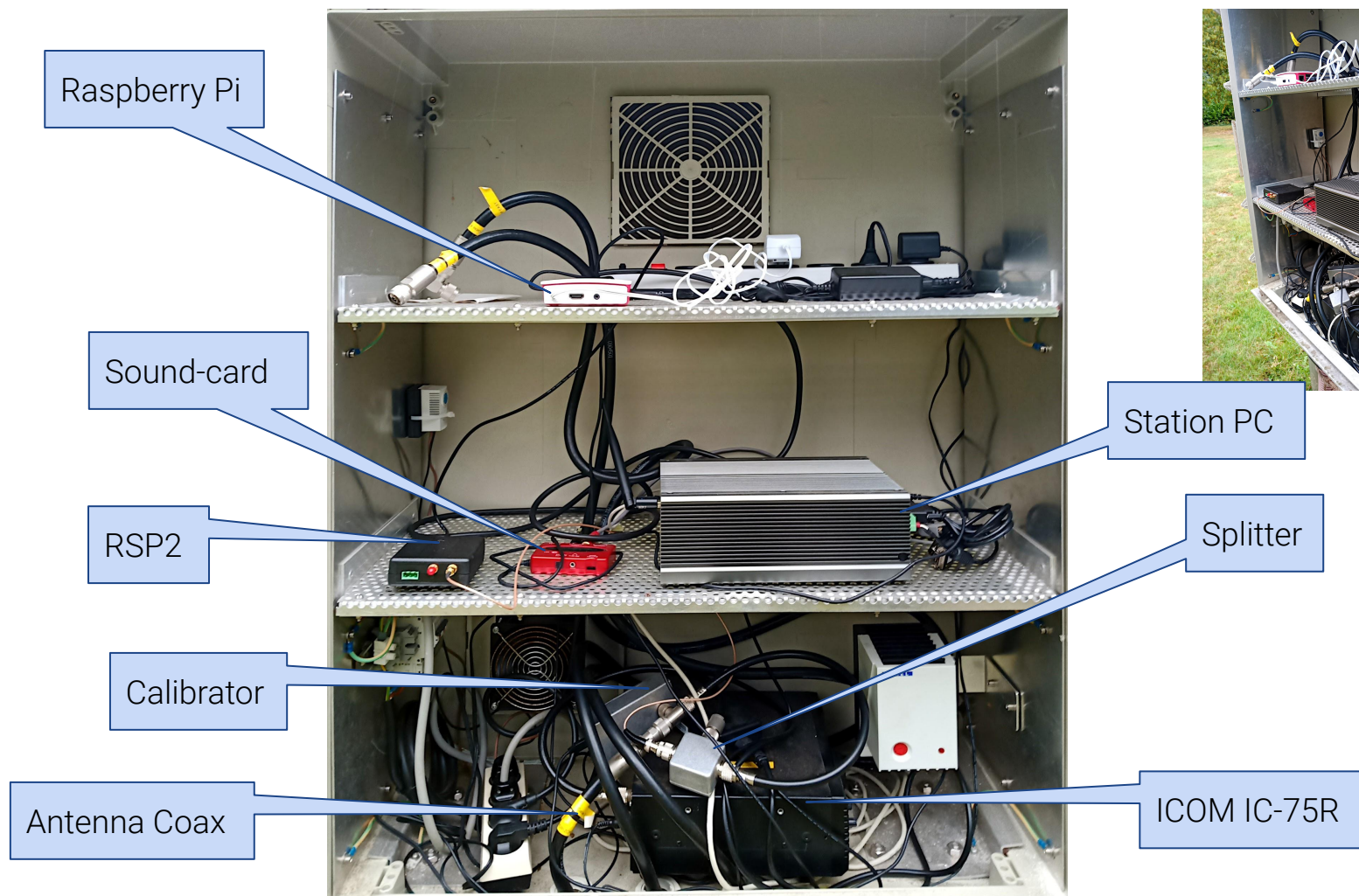
Time stamp management

- Raspbian is multitask optimized → jitter
- Packets of 1008 samples (I+Q)
- CW modulated by 1 PPS from GPS



- Jitter corrected in post-processing
- Linear fit in BRAMS file

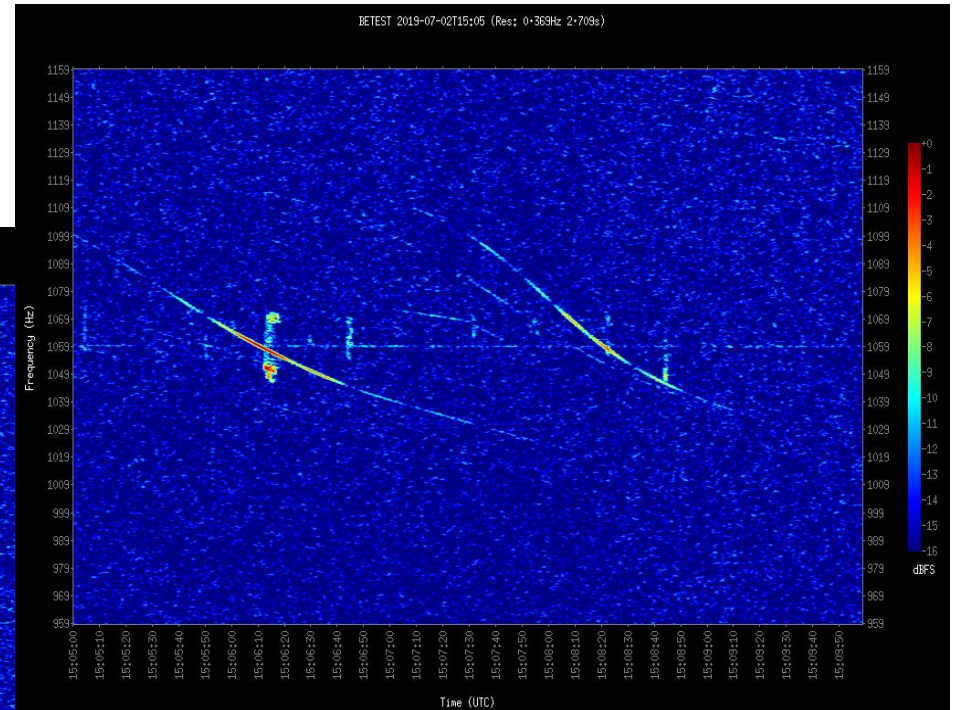
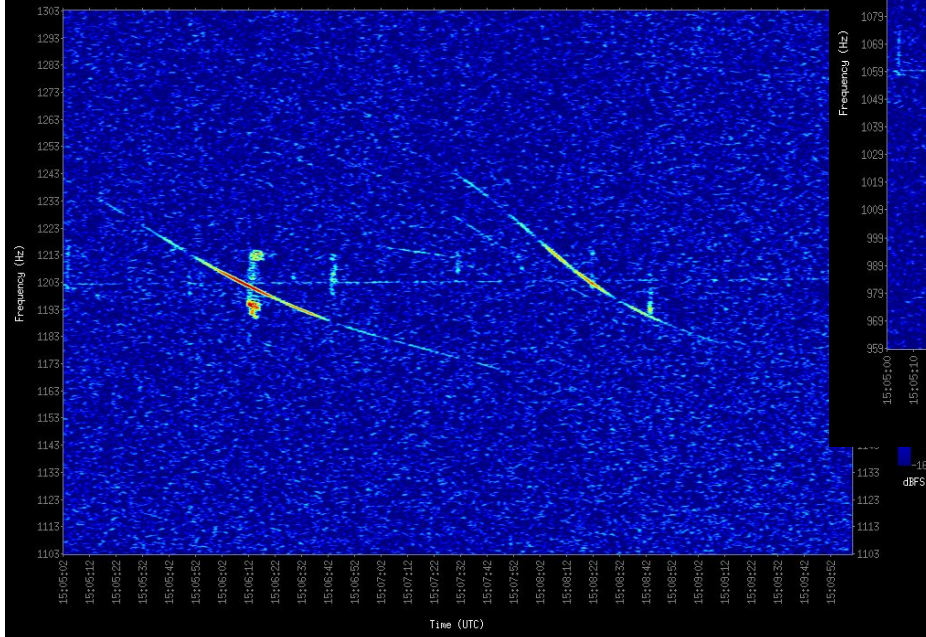
Testing at Brussels



Preliminary results

Original BRAMS station *ICOM IC-R75 + Sound-Card + PC*

Uccle 2019-07-02T15:05 (Res: 0.338Hz 2.972s)



BRAMS station v2.0
RSP2 + Raspberry Pi 3+

Observations made in Brussels (Uccle) on 2019-07-02T15:05

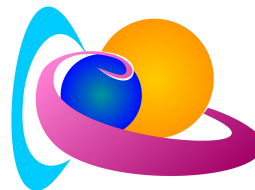
On behalf of **Michel Anciaux** (michel.anciaux@aeronomy.be)

and the rest of the BRAMS team:

Many thanks!



<http://brams.aeronomy.be/>



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