Octocopter measurements (17-19 Sept. 2012)

Satyendra Thoudam
Radboud University Nijmegen
(On behalf of the LOFAR Cosmic-Ray group)

Aim

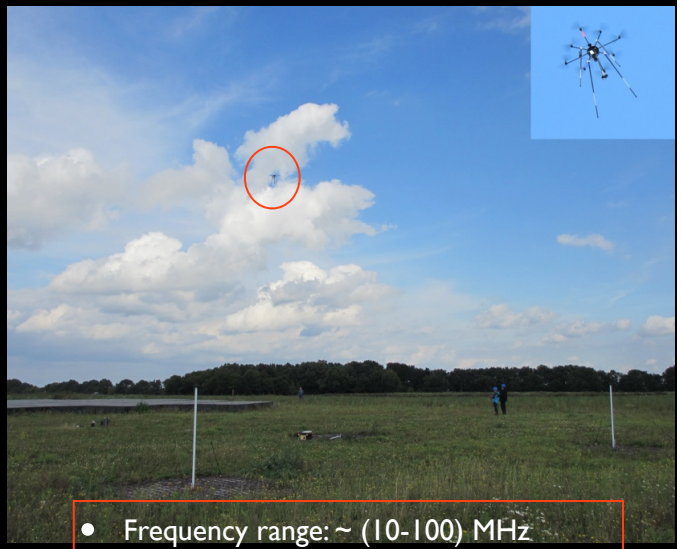
- To measure antenna gain pattern (Gain measurements)
  - Compare measurements with simulations
  - To disentangle x-y-z polarization of cosmic-ray signal
- To measure antenna cable delays (Timing measurements)
  - In nanoseconds accuracy
  - More accurate estimate of cosmic-ray arrival direction

Gain measurements

Diff. GPS &
Spectrum analyzer

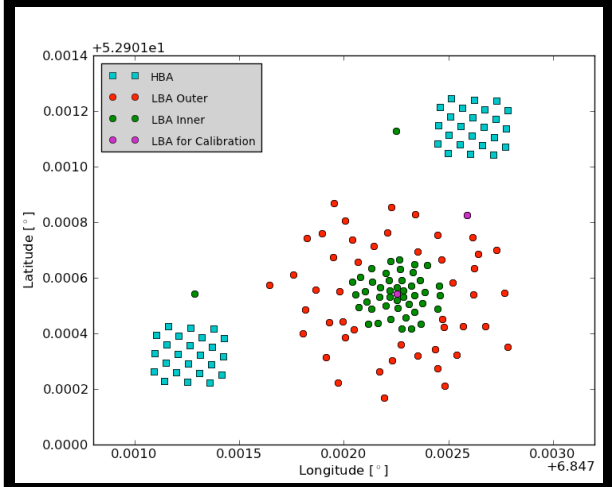
Ref. antenna

Gain measurements



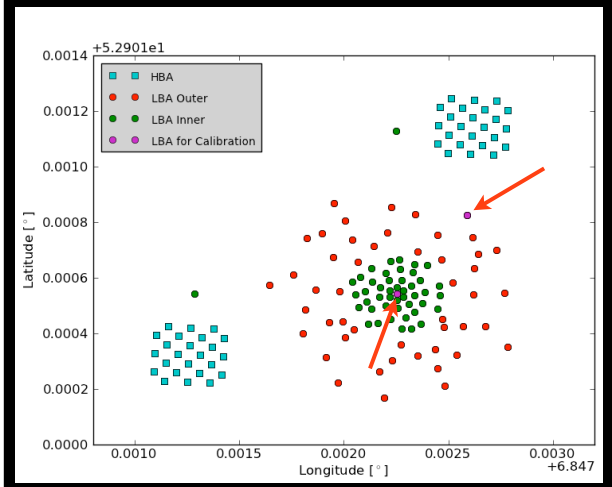
- Frequency range: ~ (10-100) MHz
- Elevation angle: ~ (5-90) deg.
- NW-SE polarization

Gain measurements



- Station CS302
- Two days
- Two antennas: PO95 and PO000

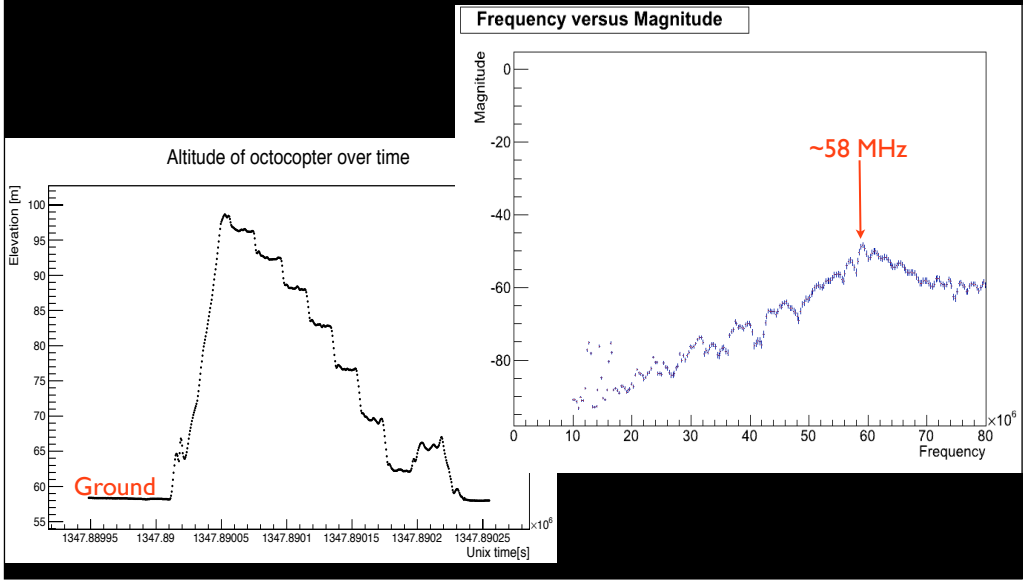
Gain measurements



- Station CS302
- Two days
- Two antennas: PO95 and PO000

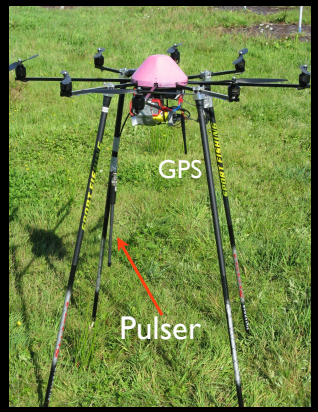
Gain measurements

Results: Still working on ....



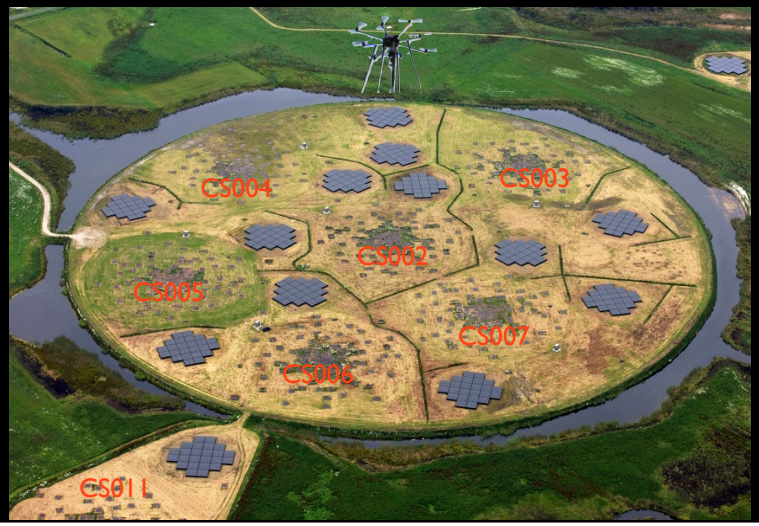
Timing measurements

- A pulser onboard the octocopter sent out signals
- Pulse rate: Once every 8 microSec≡ 12500 in 100 msec dataset
- Signal time traces on individual antennas were recorded

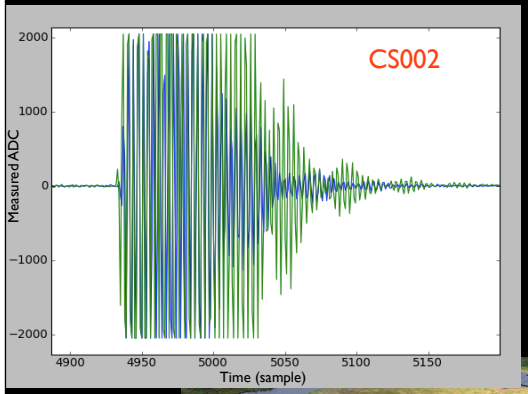


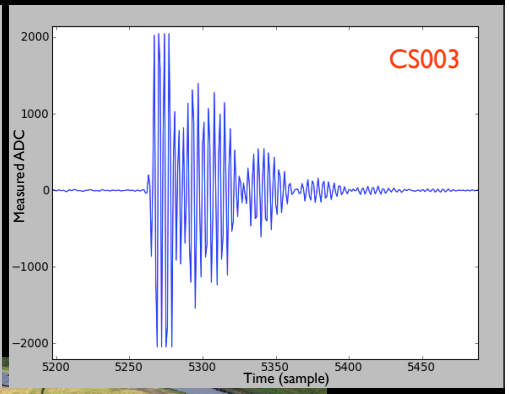
Timing measurements

- Performed at the superterp stations
- Flown directly above CS002 at 50 m



Timing measurements





Timing measurements

- Successfully completed flights over CS002
- Then, planned for CS011
- But, ...First rain.....
- Then, ... the Octocopter failed.....
- So, we finally stop measurements after 3 days

Summary and future works

- We performed horizontal antenna gain measurements
- Cable delay measurements at the Superterp stations
- These measurements will provide important inputs for our cosmic-ray data analysis
- Final results will be presented in the next few weeks

Acknowledgements: We thank Klaus, Raphael from Aachen for the Octocopter and Menno for his support during the measurements.