Crosstalk Measurements on the Station Cabinets

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Introduction

ASTRON

Motivation: results CS10 (LOFAR-ASTRON-RPT-124)

Conclusions

- crosstalk at CS10
- LVDS lines radiate at backplane connector
- picked up by analog electronics
- input power dependent effect
- adequate averaging in beam former

Measurement setup

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- CS103 cabinet at Excel
- 75 Ohm termination of RCU input
  - adds about 0.1 dB to RCU noise level
  - prevents RFI pick-up
  - modified 48 V power supply
- doors subrack cabinet closed
- LCU used for control of station correlator

LBA measurement (1)

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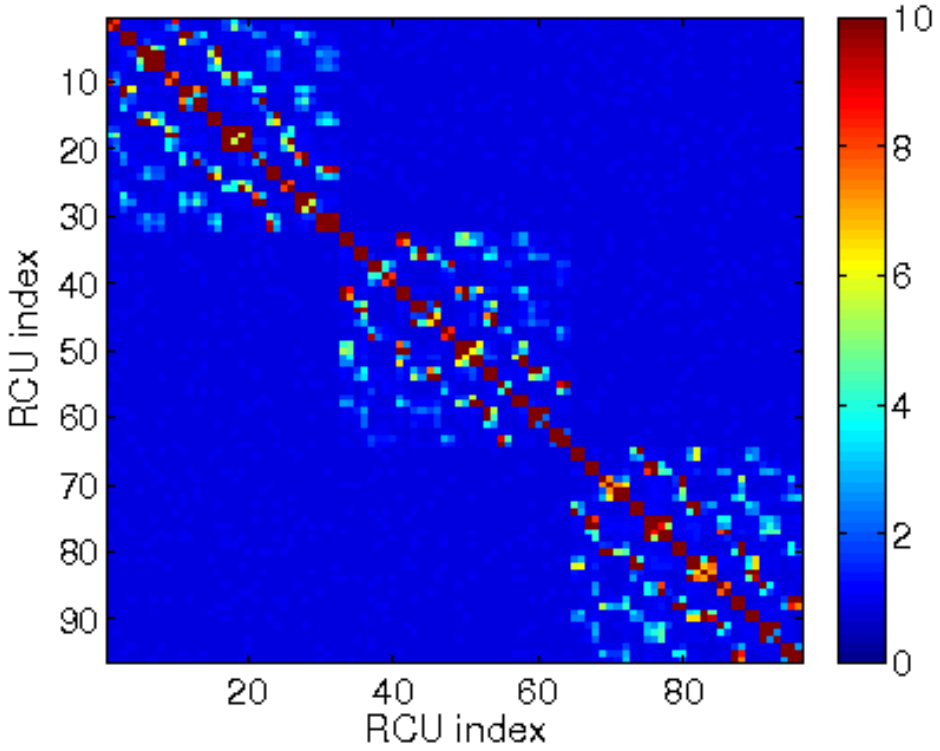
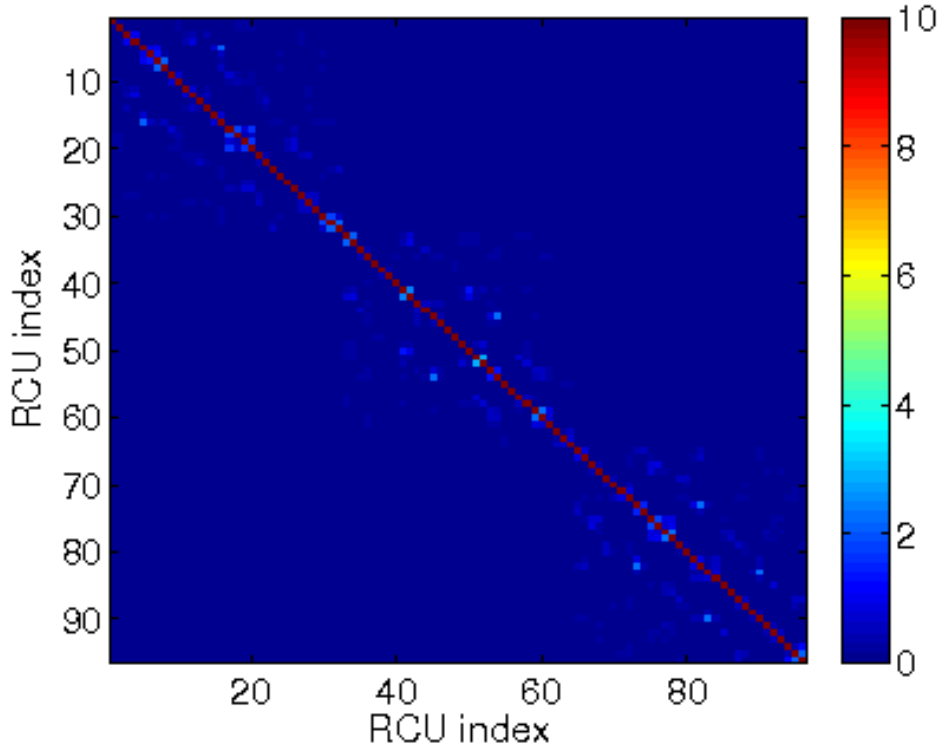
single frequency sweep, 32 s integration per subband

average absolute value (l) and absolute average value (r)





LBA measurement (2)

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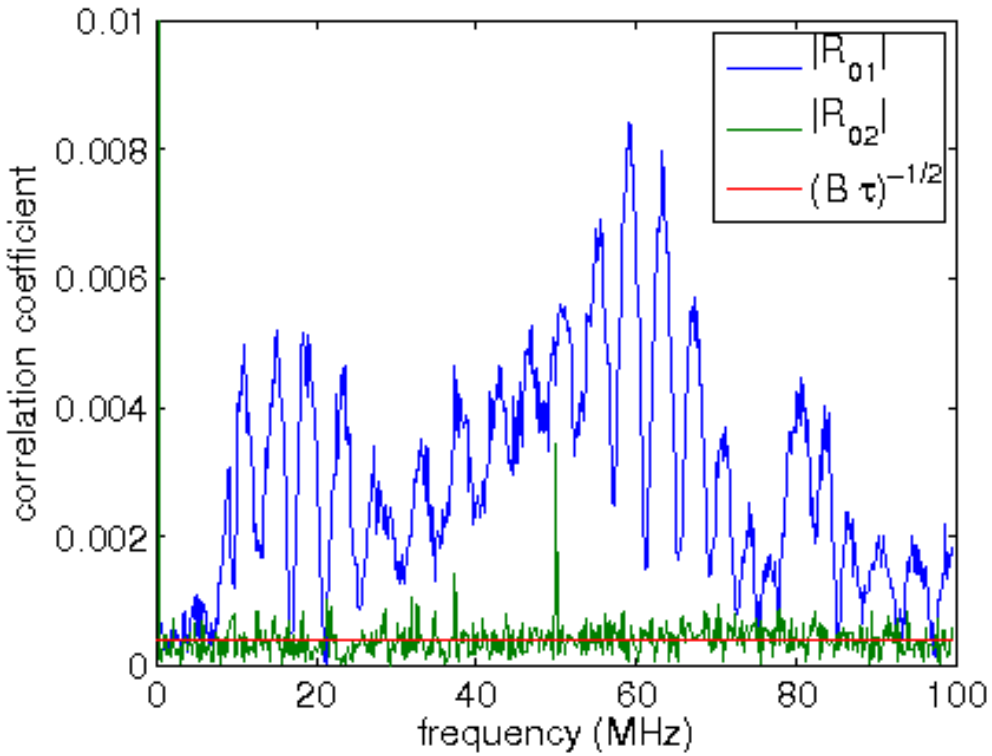
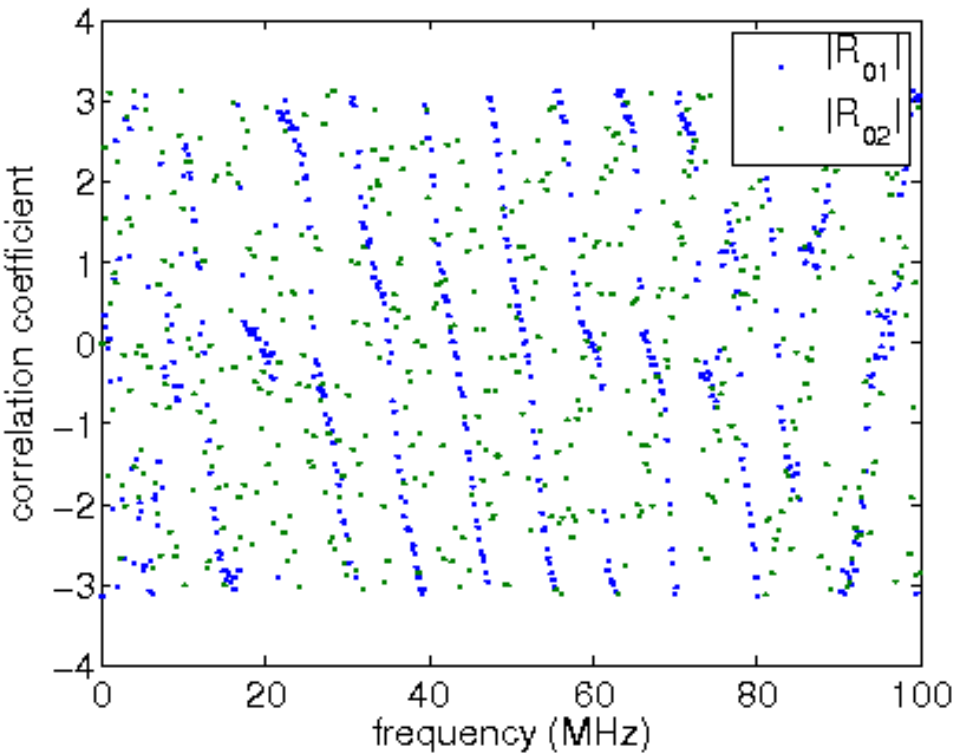
crosscorrelation amplitude (left) and phase (right)

What happens in subband 256 (50 MHz)?





LBA measurement (3)

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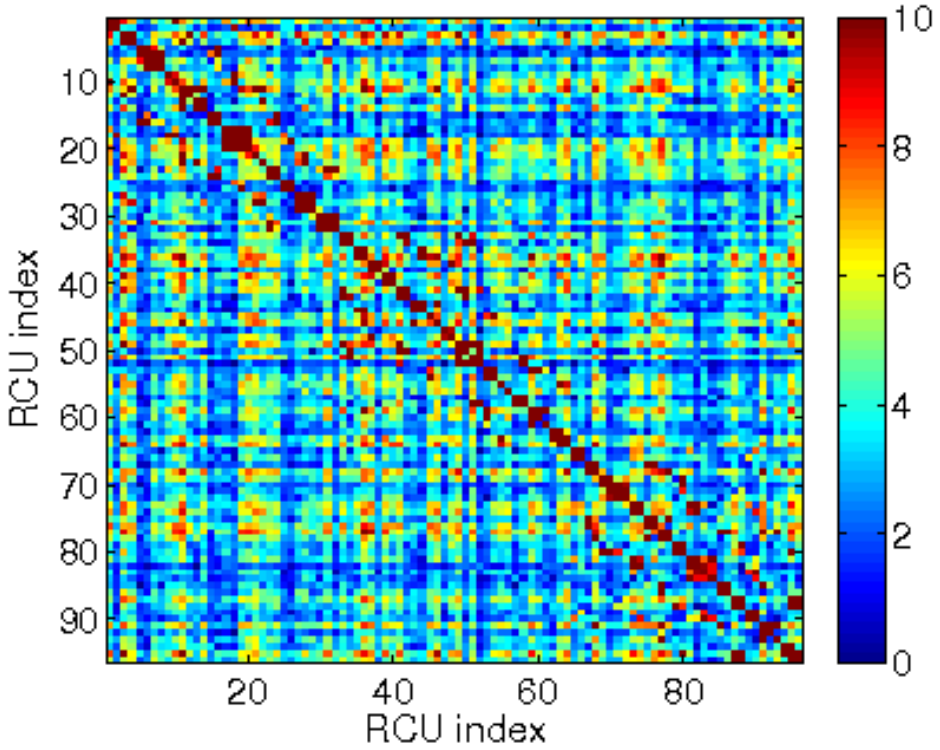
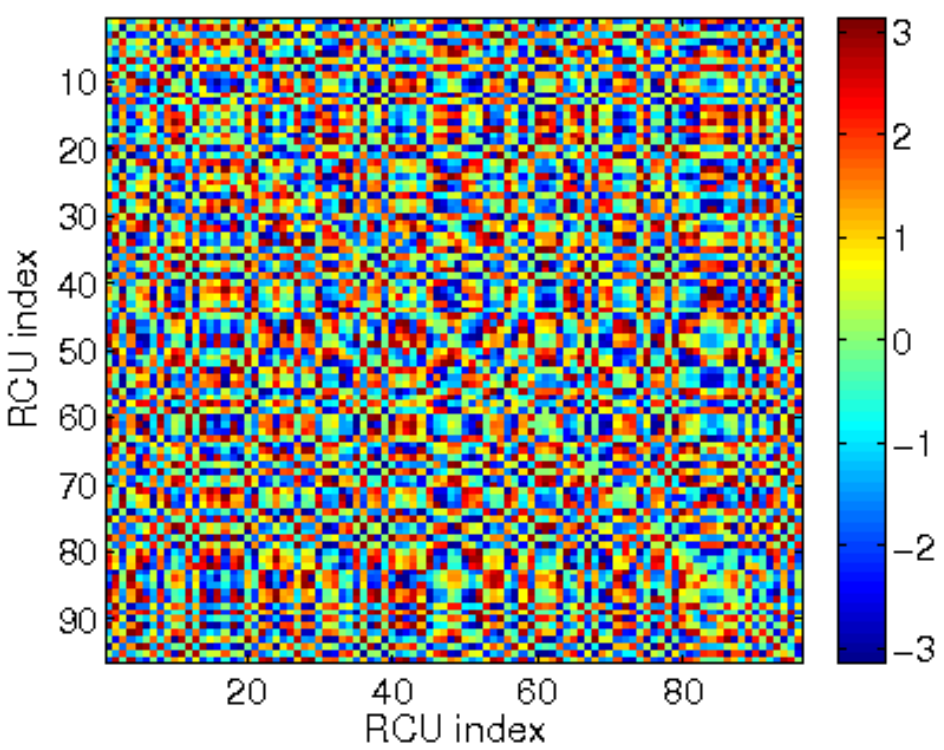
correlation amplitude (left) and phase (right)

Clear signal common to all RCUs





HBA measurement (1)

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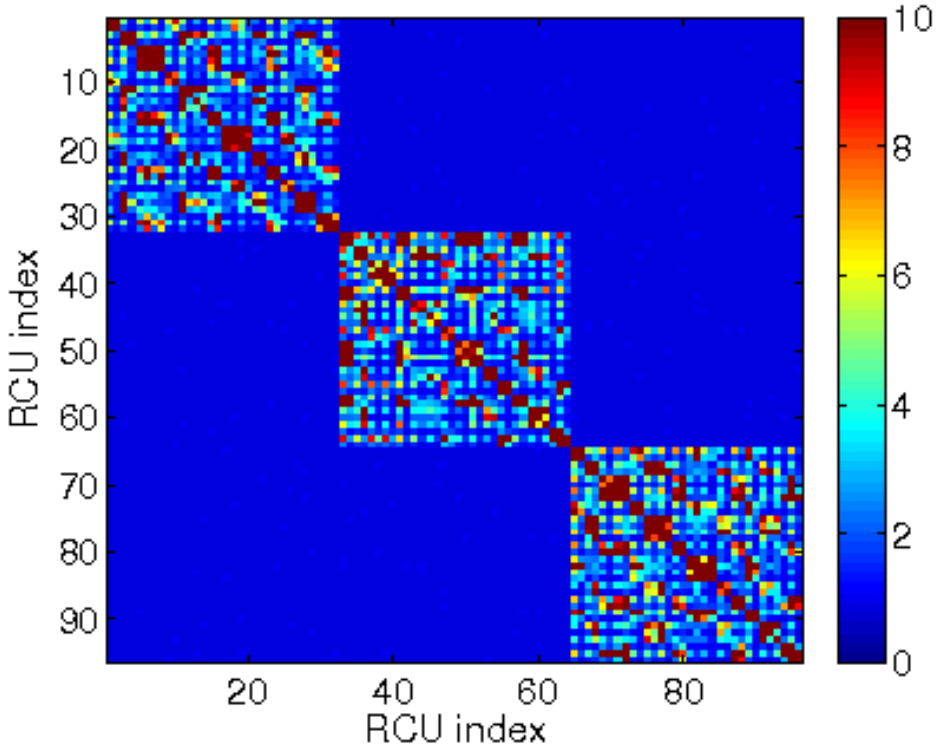
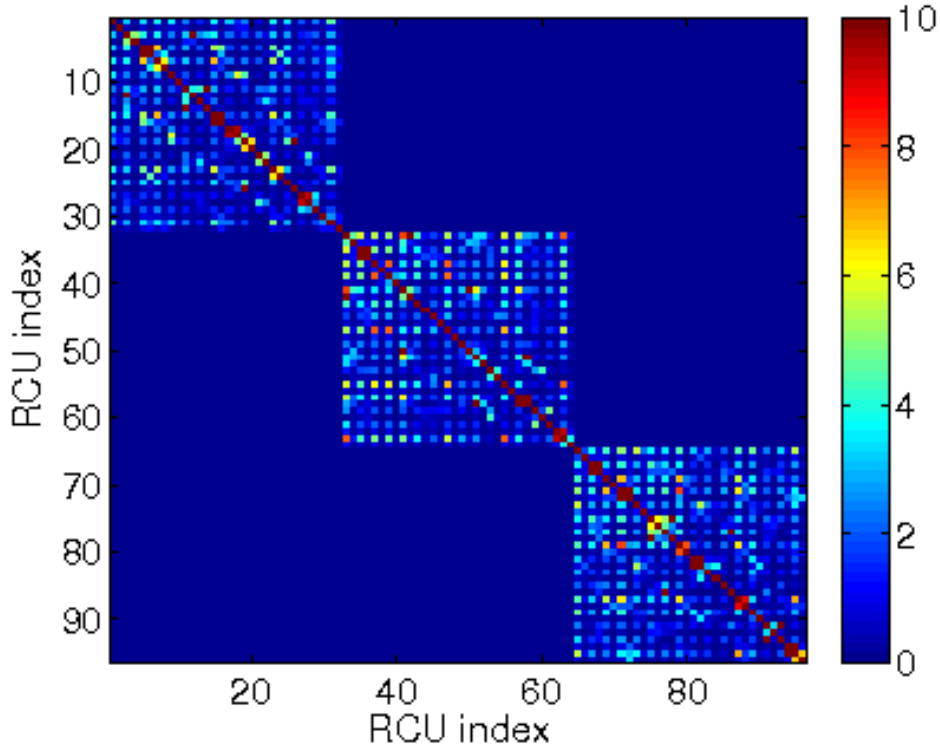
single frequency sweep, 64 s integration per subband

average absolute value (l) and absolute average value (r)

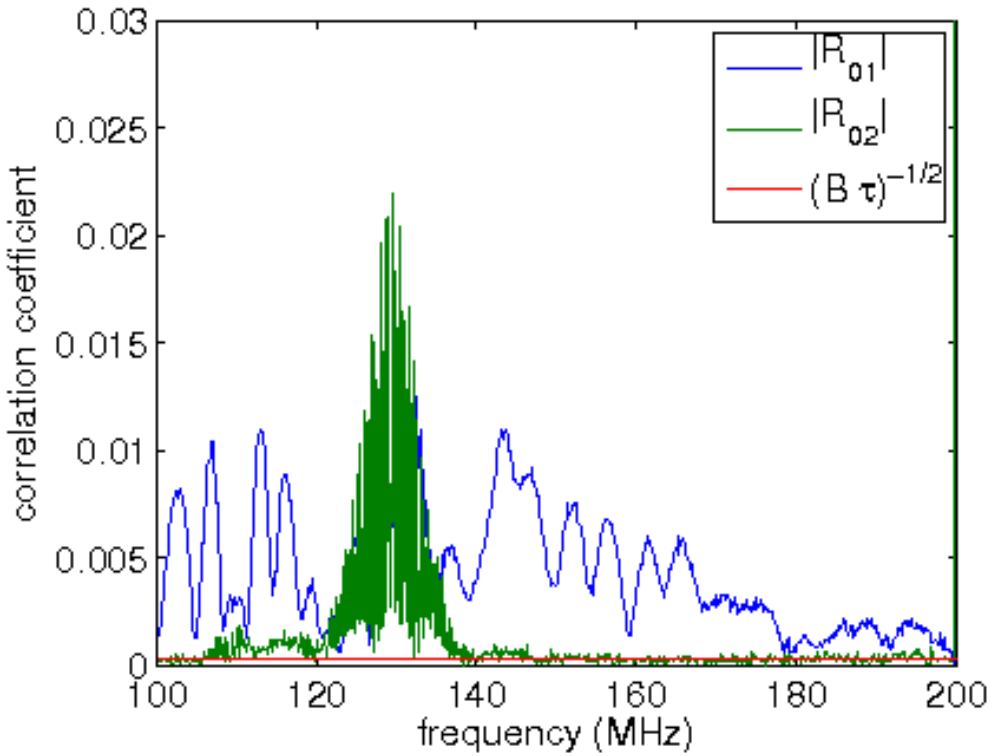


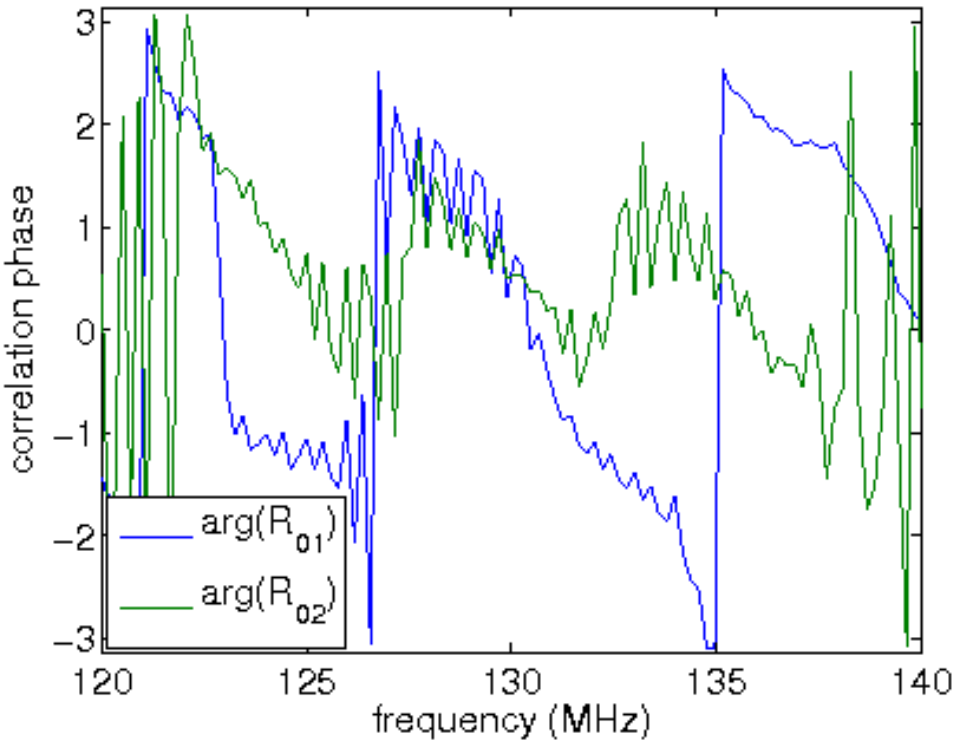


HBA measurement (2)

crosscorrelation amplitude (left) and phase (right)

Power supply has serious impact





HBA measurement (3)

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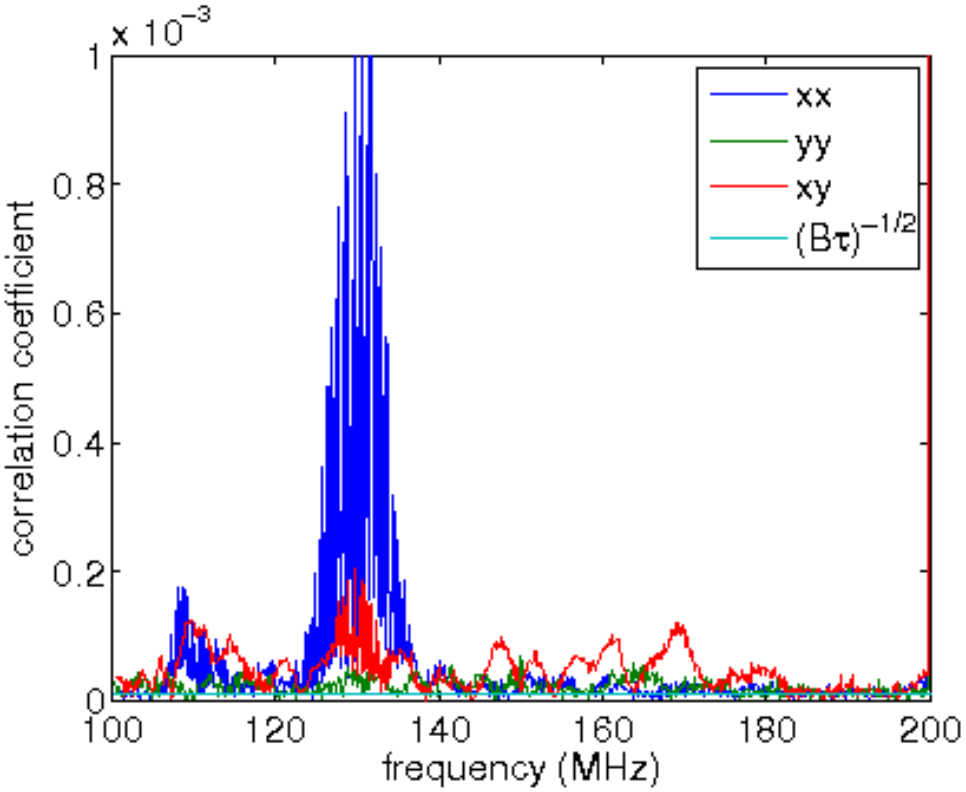
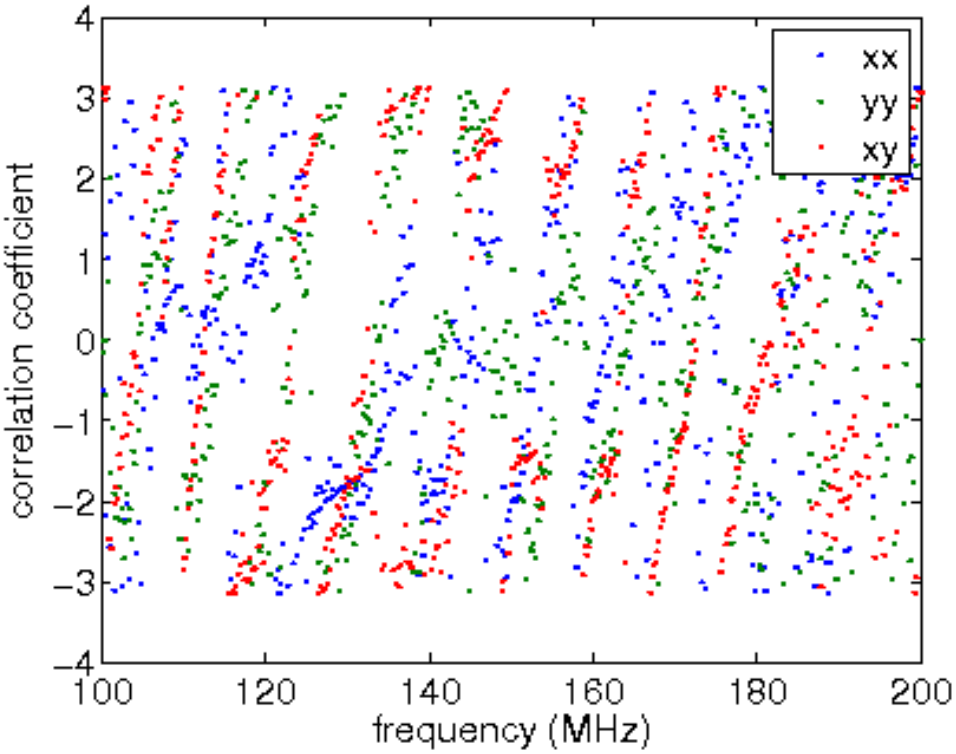
correlation between HBA substations pointed to zenith

Clear correlation on baseline between “ears”





Summary

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LBA

- crosstalk only within subrack
- exception: common 50 MHz signal
- no difference between “x”- and “y”-RCUs

HBA

- crosstalk only within subrack
- correlation between “x”-RCUs due to power supply
- correlation between HBA substations