

LOFAROPS – 3C295 data analysis:

HBA-low SEFD data
and bandpass ripple

Ger de Bruyn

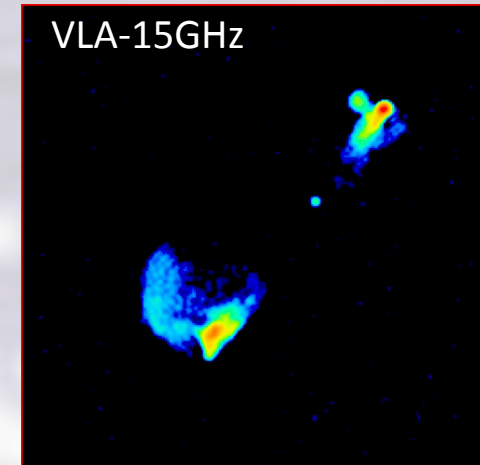
with some help from Oscar Martinez and Andre Gunst

3C295 data analysis

RA= 14h 12m Dec = +52° 12'! → < 1° from zenith !

Adopted flux density in HBA-low (115-163 MHz) :

$$S = 100 (\nu / 125 \text{ MHz})^{-0.5} \text{ Jy}$$



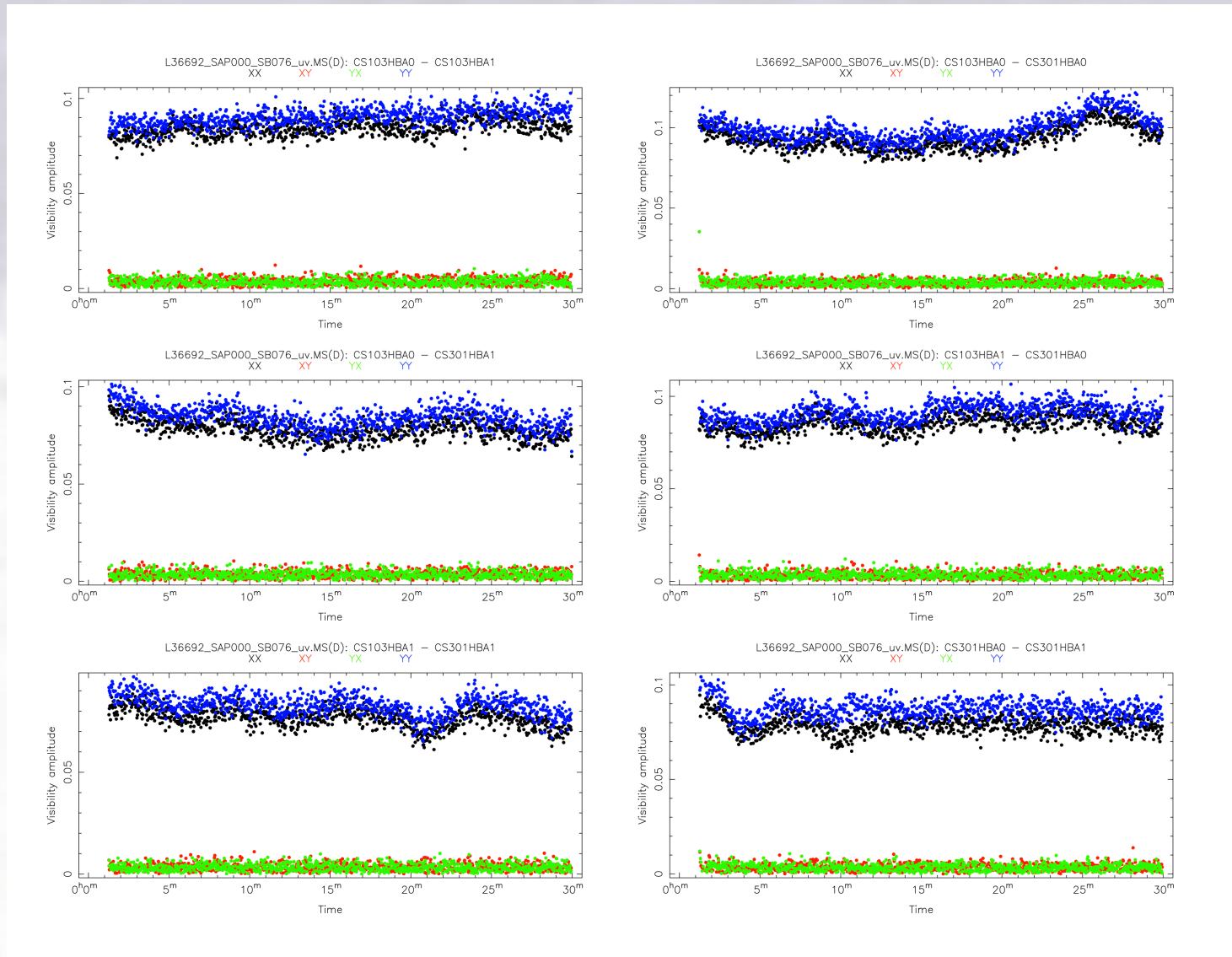
5" double

Visibility data have been used to study:

- 1) Data quality/stability on various CS and RS stations (Oct11 – Jan12)
- 2) Overall noise in the HBA-band (120-168 MHz, RCU Mode5)
- 3) Bandpass shape and ~ 1 MHz ripple

Today's analysis using data from: L36692 13 Dec 2011 (UT 1145-1215)

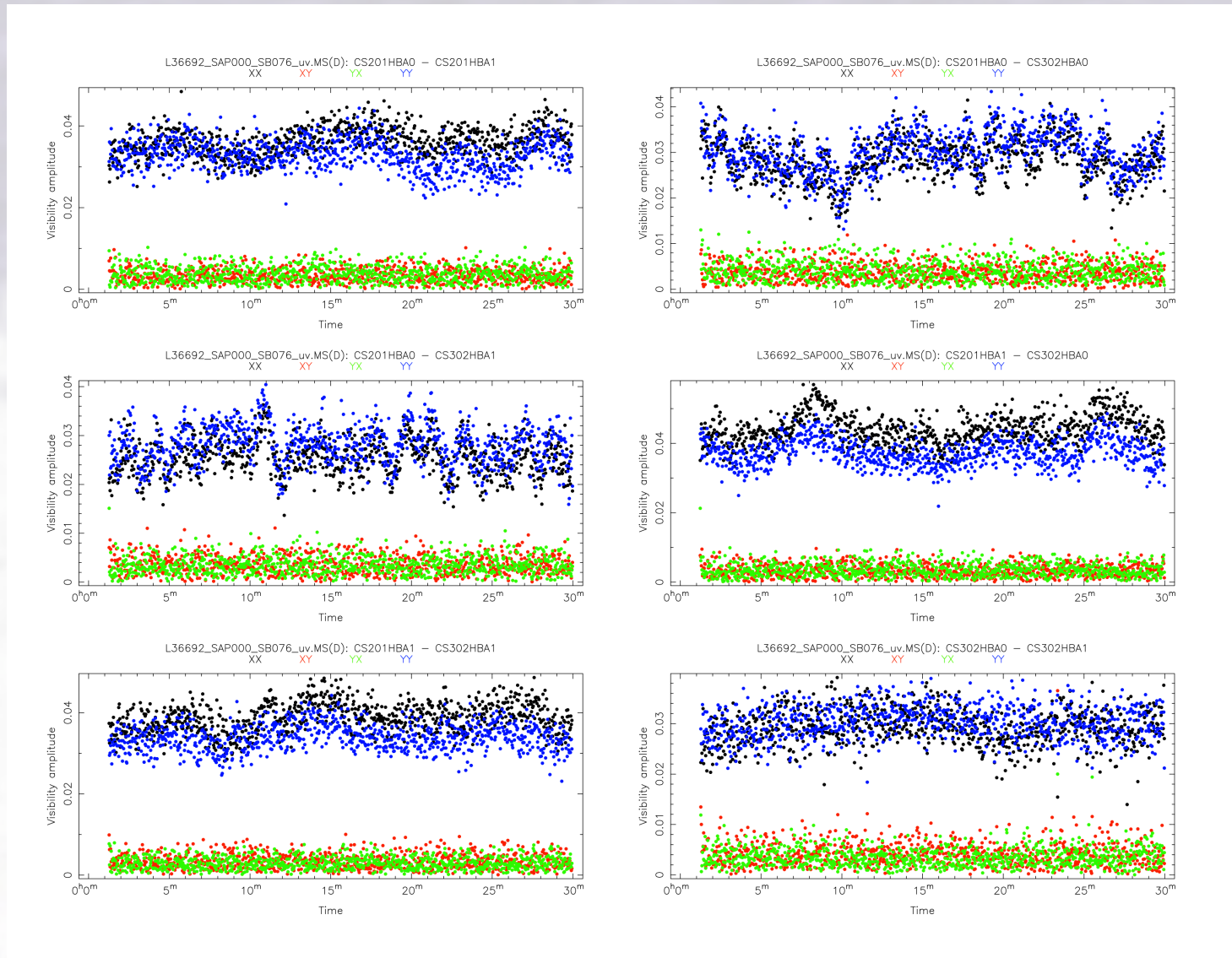
Good stations: CS103 HBA0/1 and CS301 HBA0/1

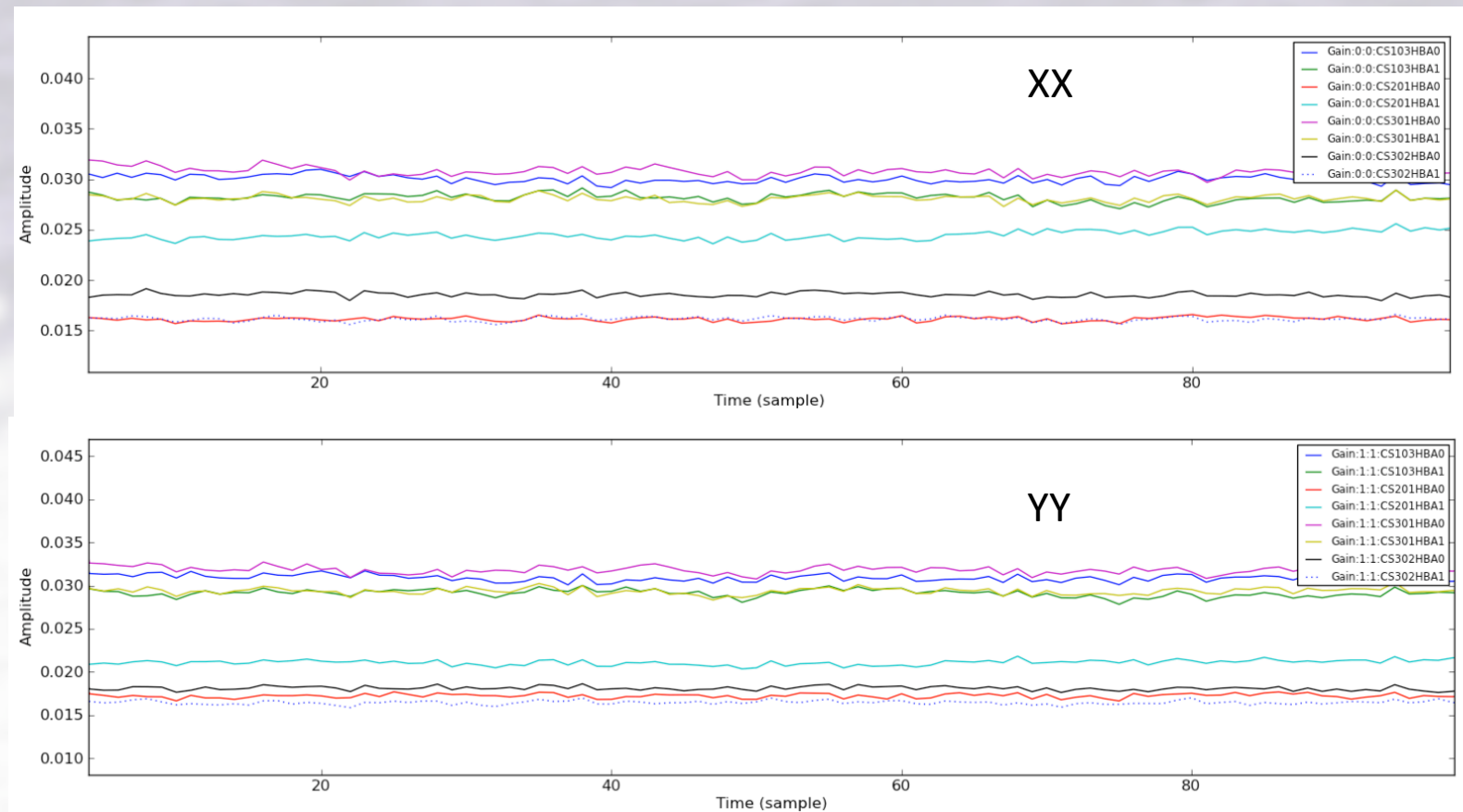


135 MHz

2s

Bad stations: CS201 HBA0/1 and CS302 HBA0/1

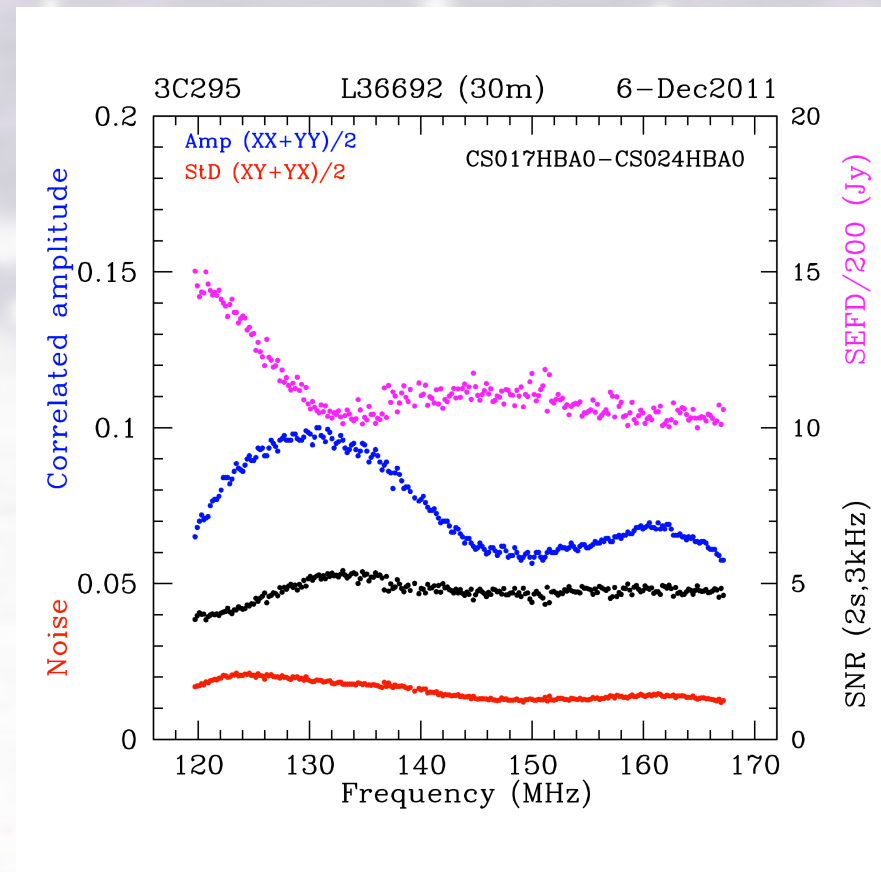
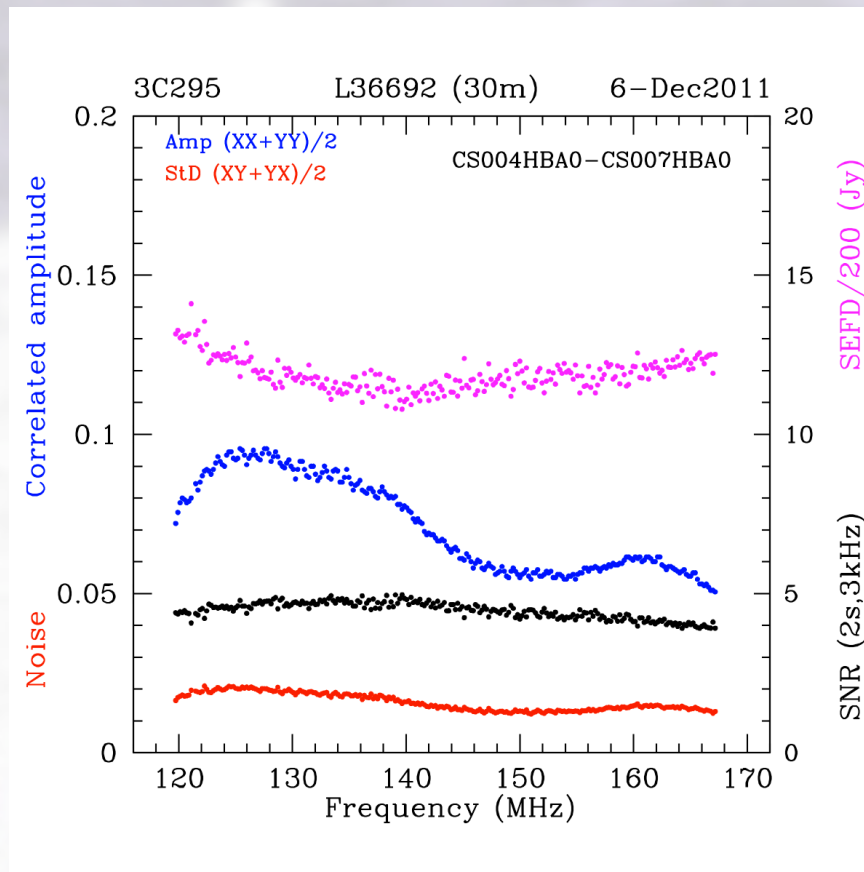




SNR ratios determined from raw visibility scale approximately as $(\text{BBS-gains})^{-2}$

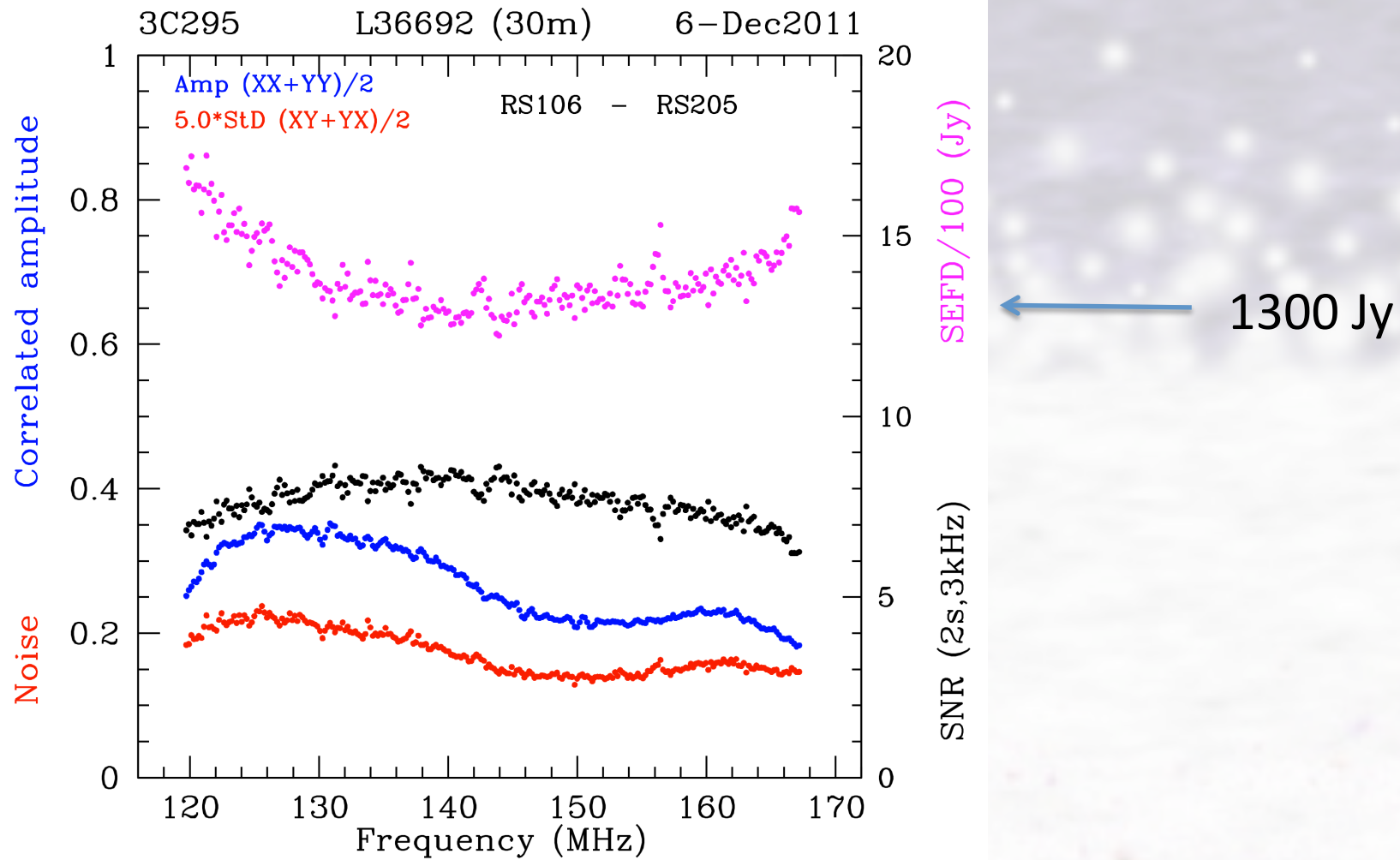
Bandpass, SNR and SEFD versus frequency

Data transferred to and processed on EoR cluster using scripts of Oscar Martinez Rubi

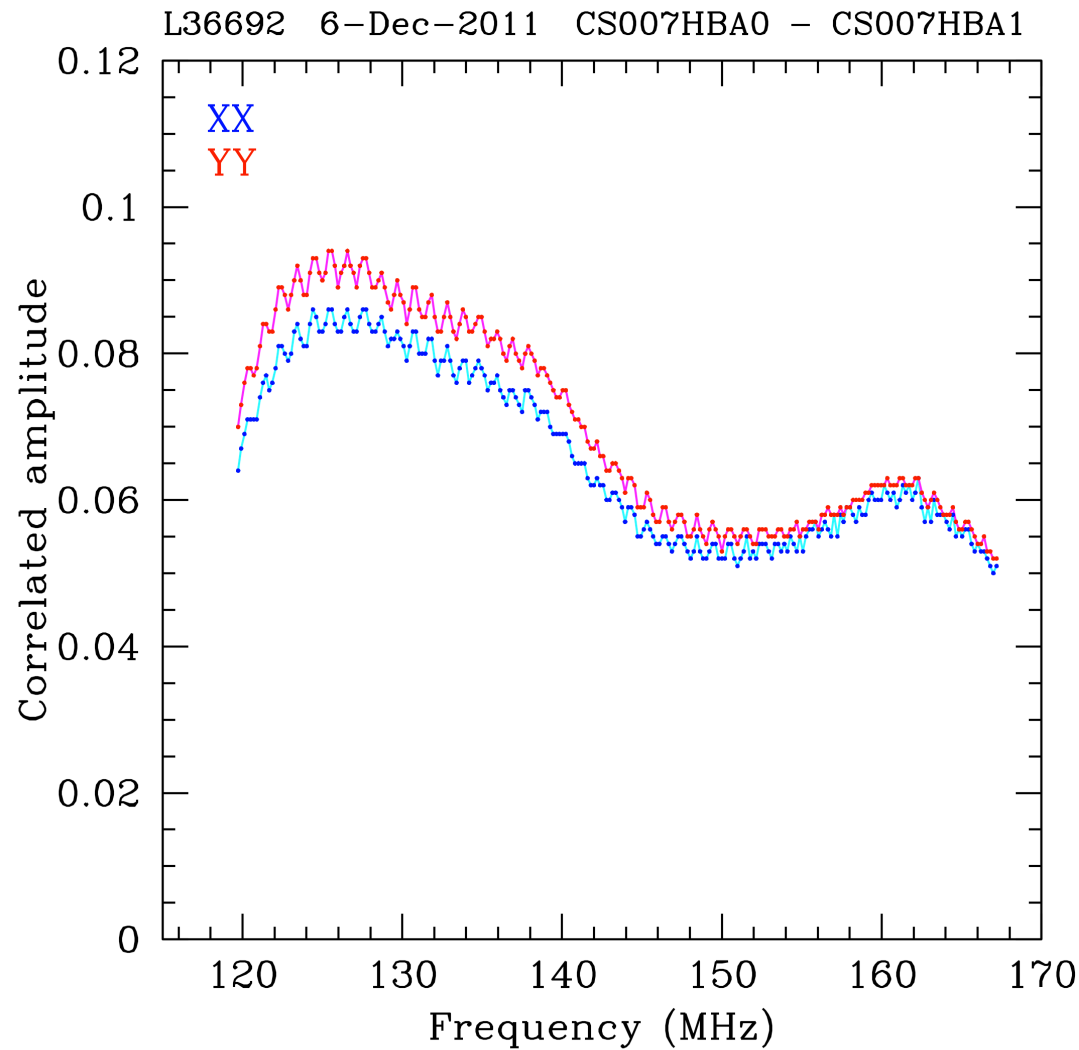


$$\sigma = \text{SEFD} / \text{SQRT}(2 \Delta\nu \cdot \Delta\tau) \quad 1 \text{ pol}$$

Bandpass and SEFD on Remote Stations



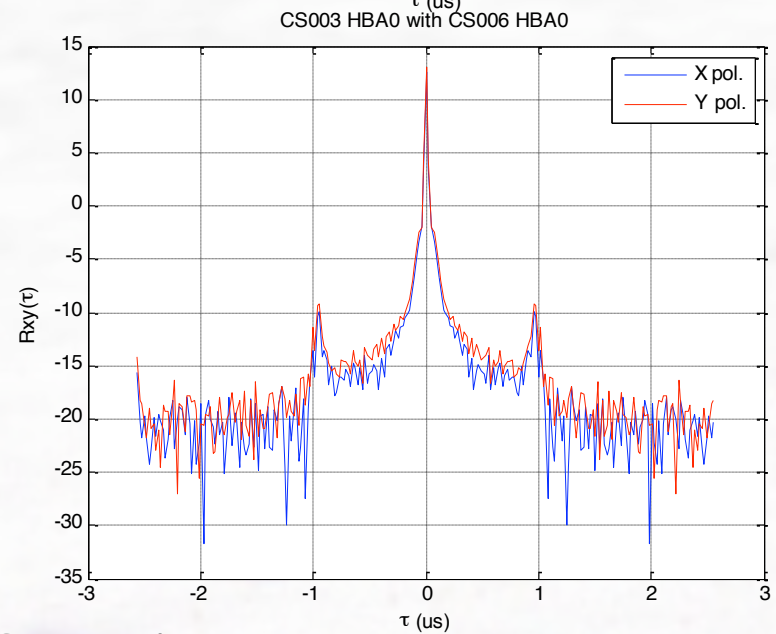
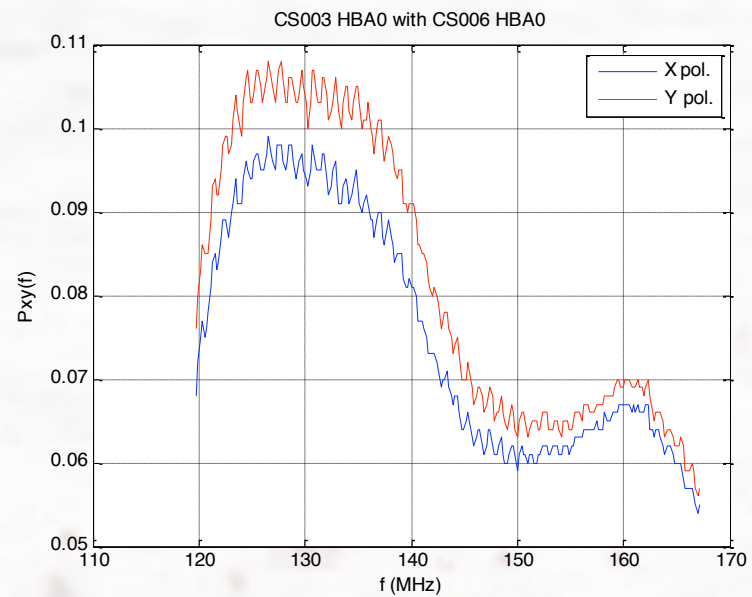
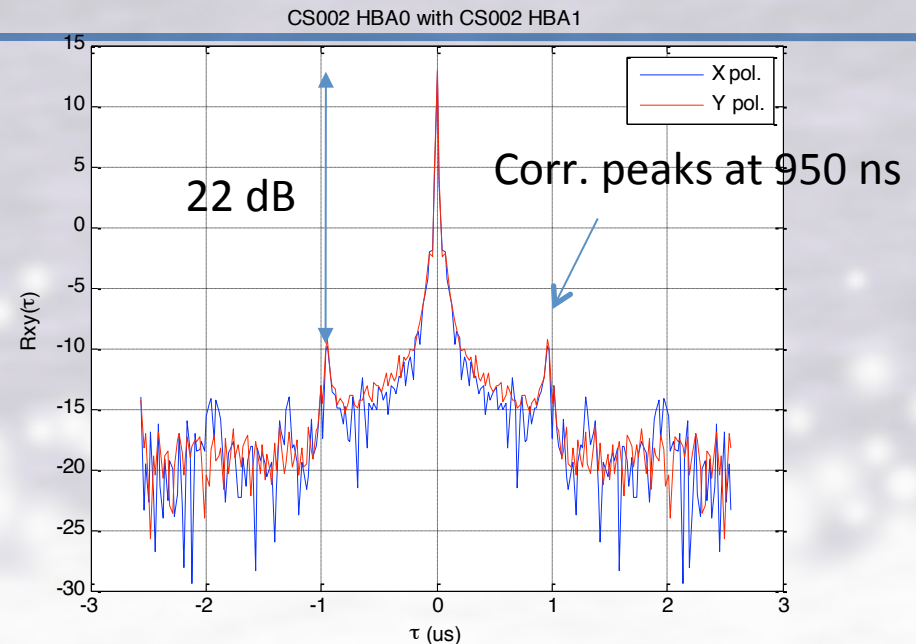
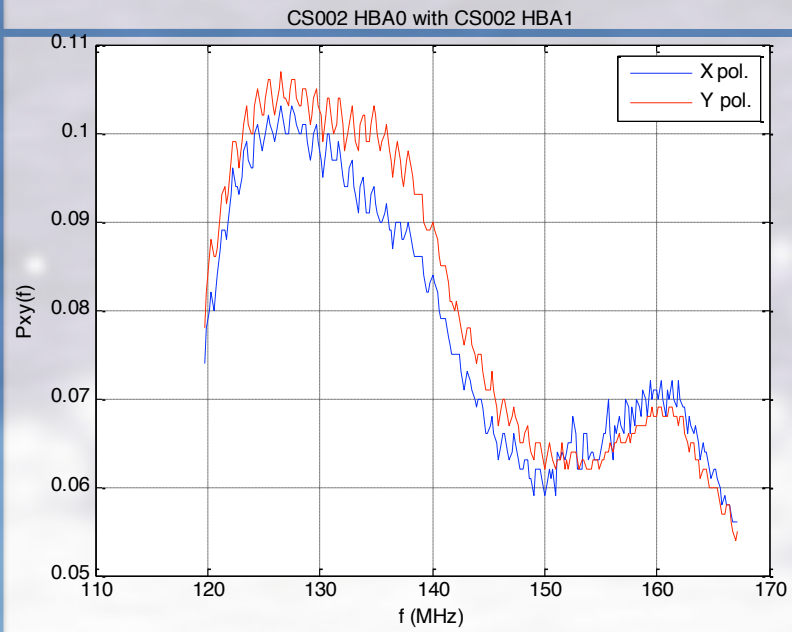
Detailed HBA-low bandpass shape

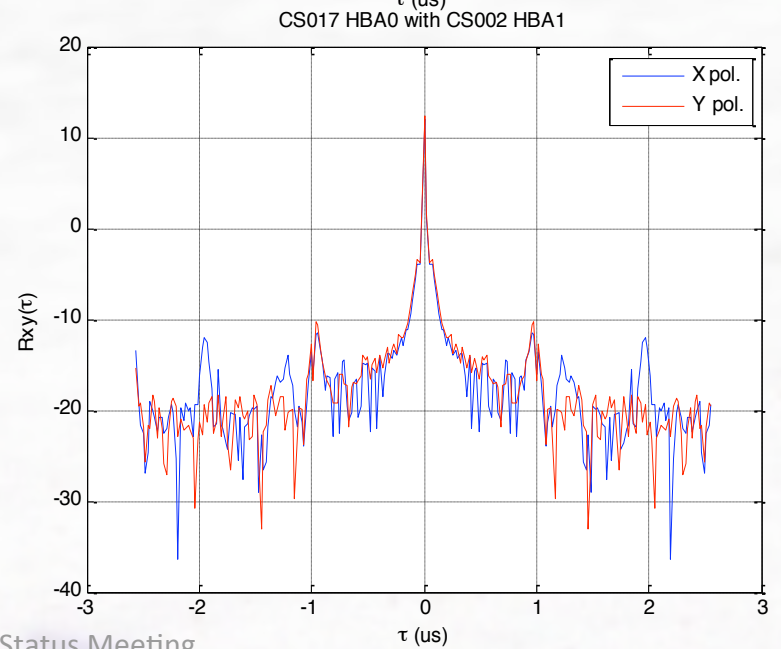
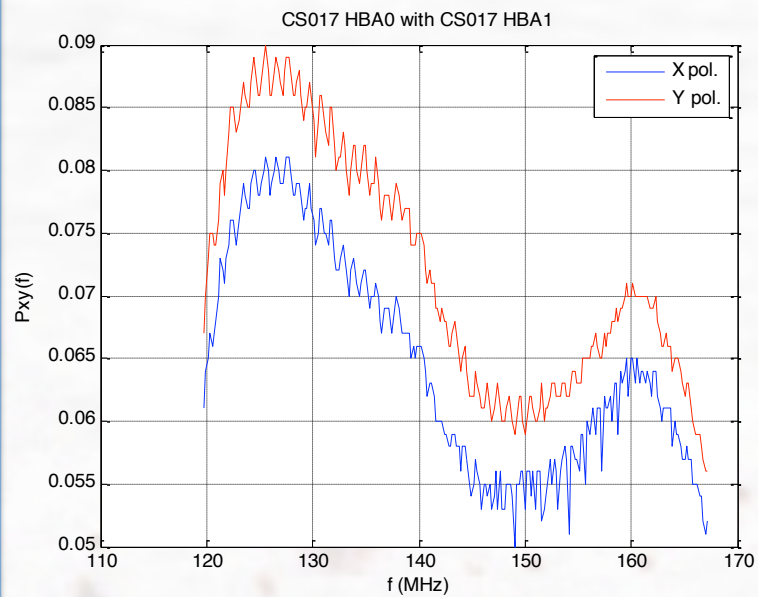
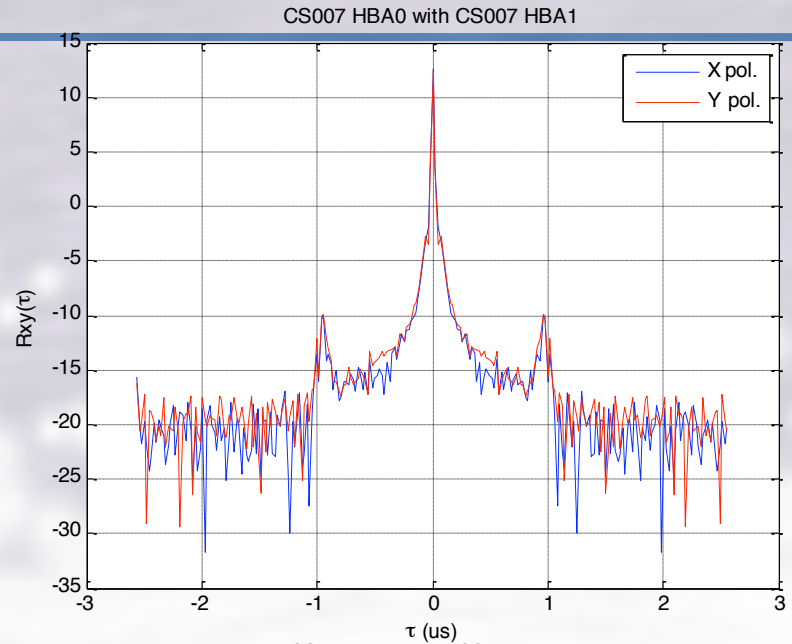
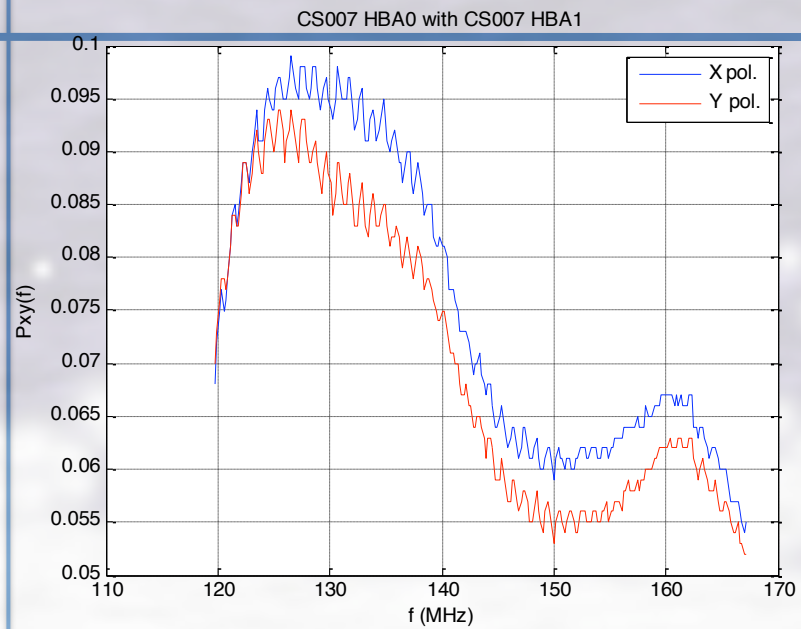


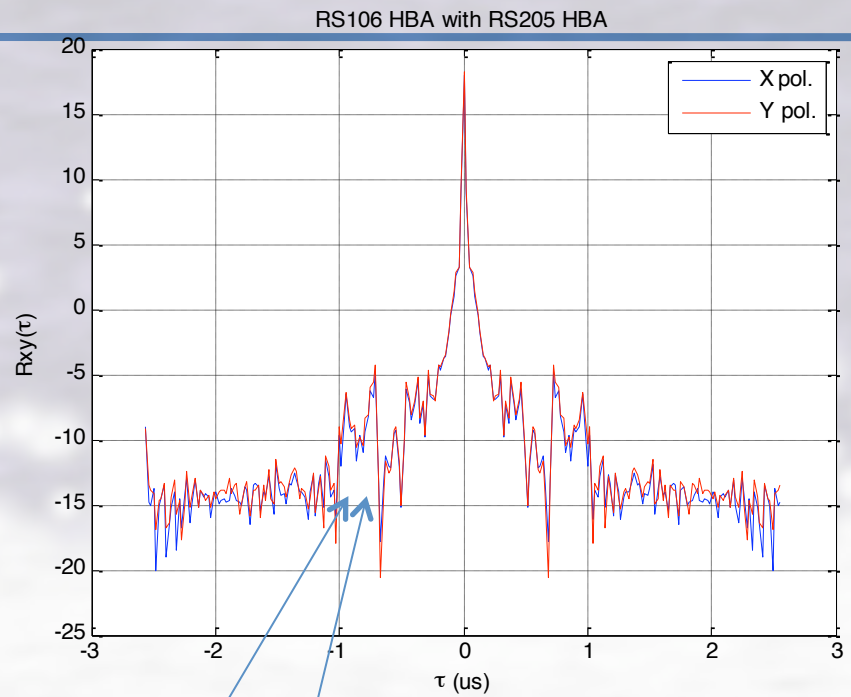
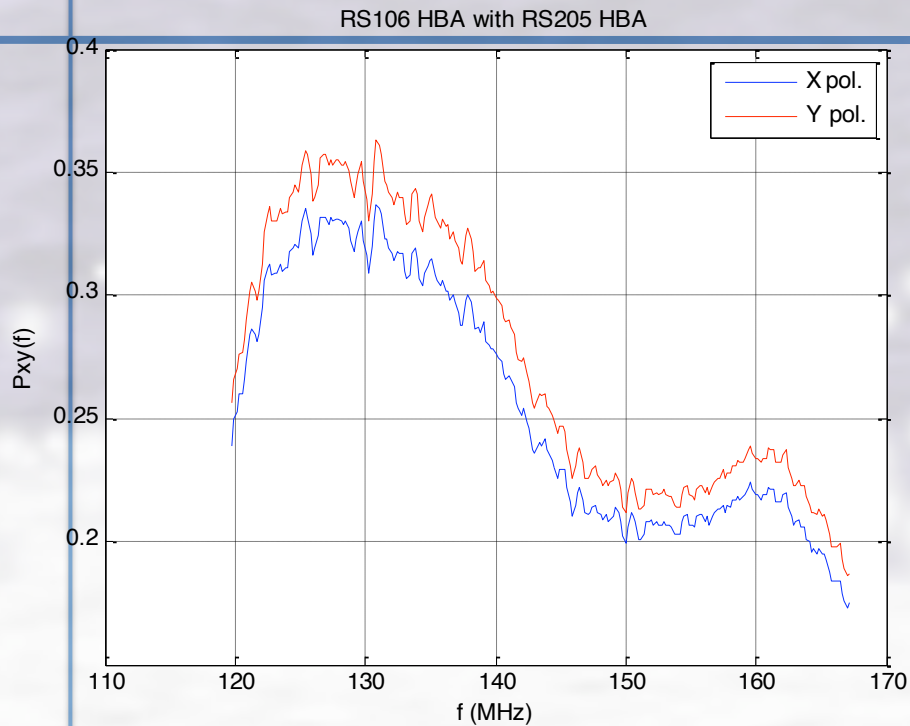
Approximately 1 MHz ripple

In both XX and YY

Amplitude decreases slightly with frequency







720 ns

950 ns

Frequency ripple, and corresponding time delays, due to coax cable length of 85 m and 115 m respectively (signal speed $\sim 0.8 c$)

Signals get reflected at RCU (~ 7 dB), suffer 2x 6dB transmission loss $\rightarrow \sim 20$ dB

Conclusions

Regular 30m-monitoring of 3C295 (amp, phase, bandpass)

Broad-band zenith HBA SEFD-values of **good** stations (130-160 MHz)

CS ~ 2200-2400 Jy

RS ~ 1300 Jy

Many stations factor 2-4 worse → under investigation (cal tables?)

HBA-low bandpass ripples:

~ 1 MHz ripple on CS (115 m cables)

~ 1 and 1.4 MHz ripple on RS (85 and 115 M cables)

Stability/calibratability of this ripple under investigation