

DBBC3 Testing for APEX and Pico Veleta

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DBBC3 EHT Design Review History

2018 Aug+Sep:

Tests on APEX DBBC3 in lab in Bonn
System characterization, zero-baseline test, comparison to R2DBE, etc

2018 Sep 13 Engineering Review Telecon

J Weintroub (chair) et al.
Generated 45 ORA's (Observation, Response & Action)

2018 Sep 14-24

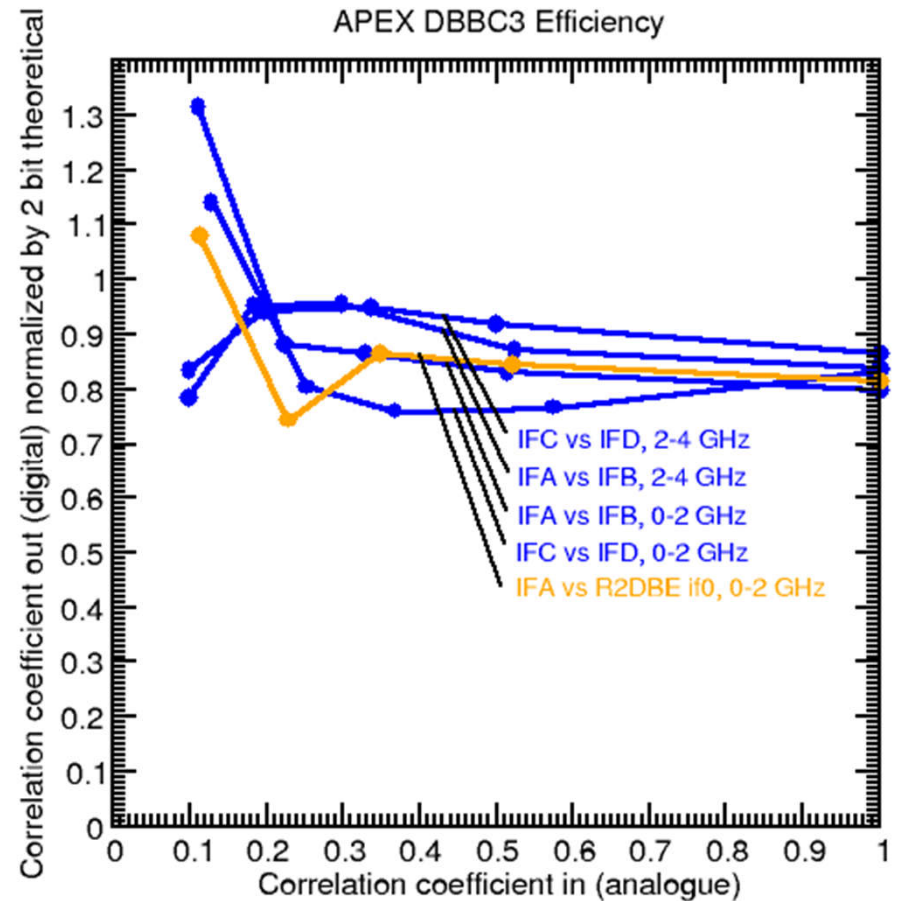
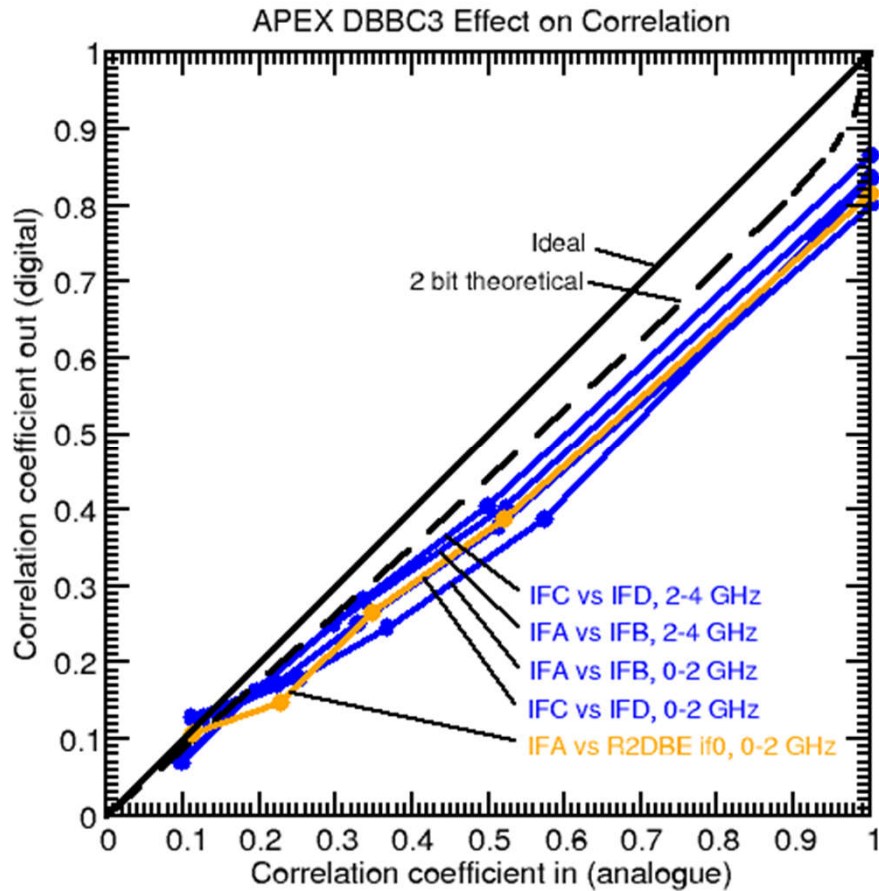
39 ORA's addressed,
6 ORA's remain open (primarily improve the efficiency measurement)
Designed improved analogue noise source combiner network / ordered components

2018 Sep 25-Oct 24 (No activity - EHT 345 GHz fringe test, Alan in APEX)

2018 Oct 25-Nov 5 Components arrive, assembled improved combiner network
Addressing ORA #27 (excess PN in 2048 MHz sampler clock)
Addressing ORA #21 (better efficiency measurement)

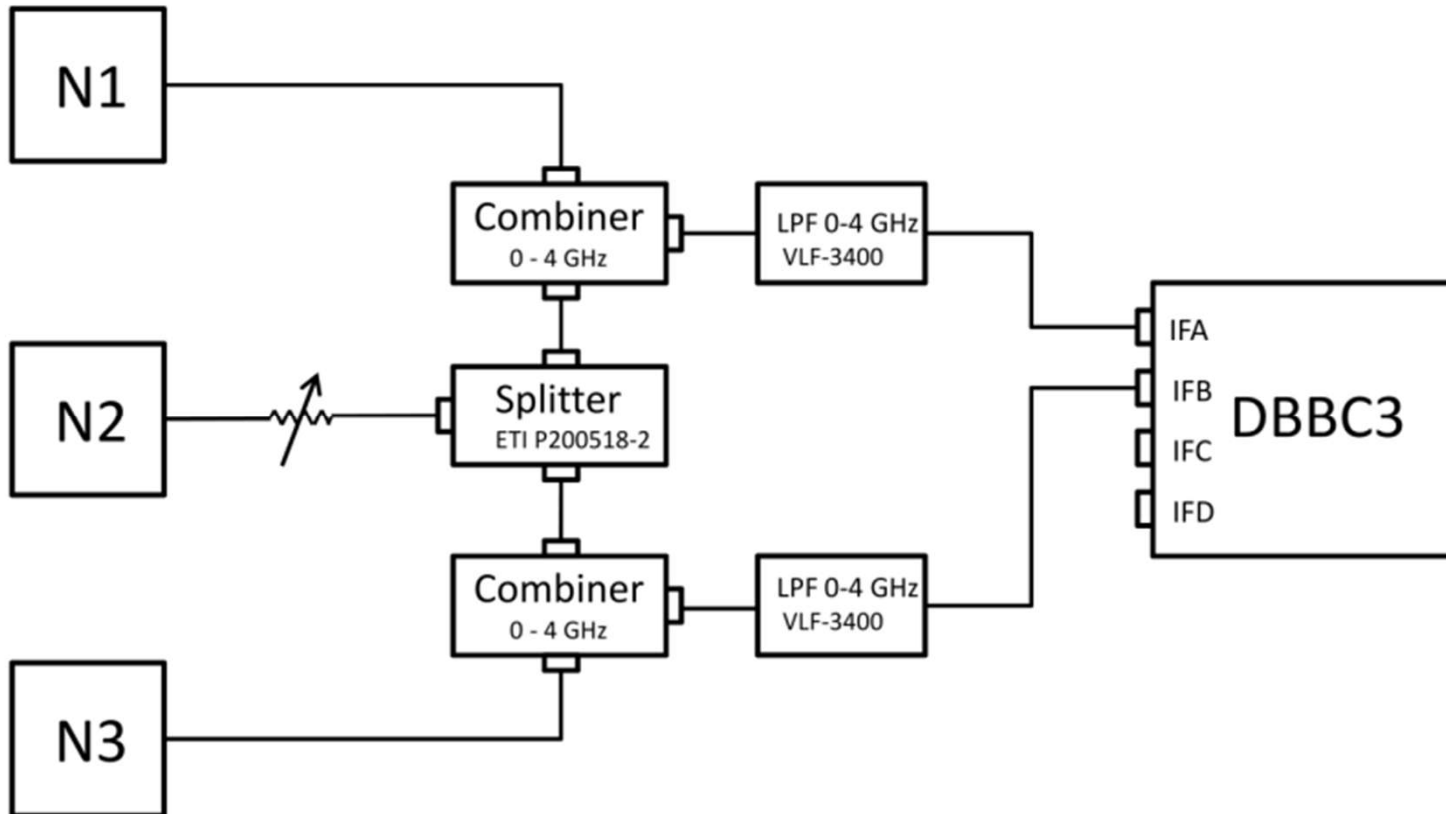
2018 Nov 6 This meeting (EHT Collaboration Meeting Nijmegen)

Zero Baseline Test: zerocorr analysis example for $\rho_0 = 0.336$

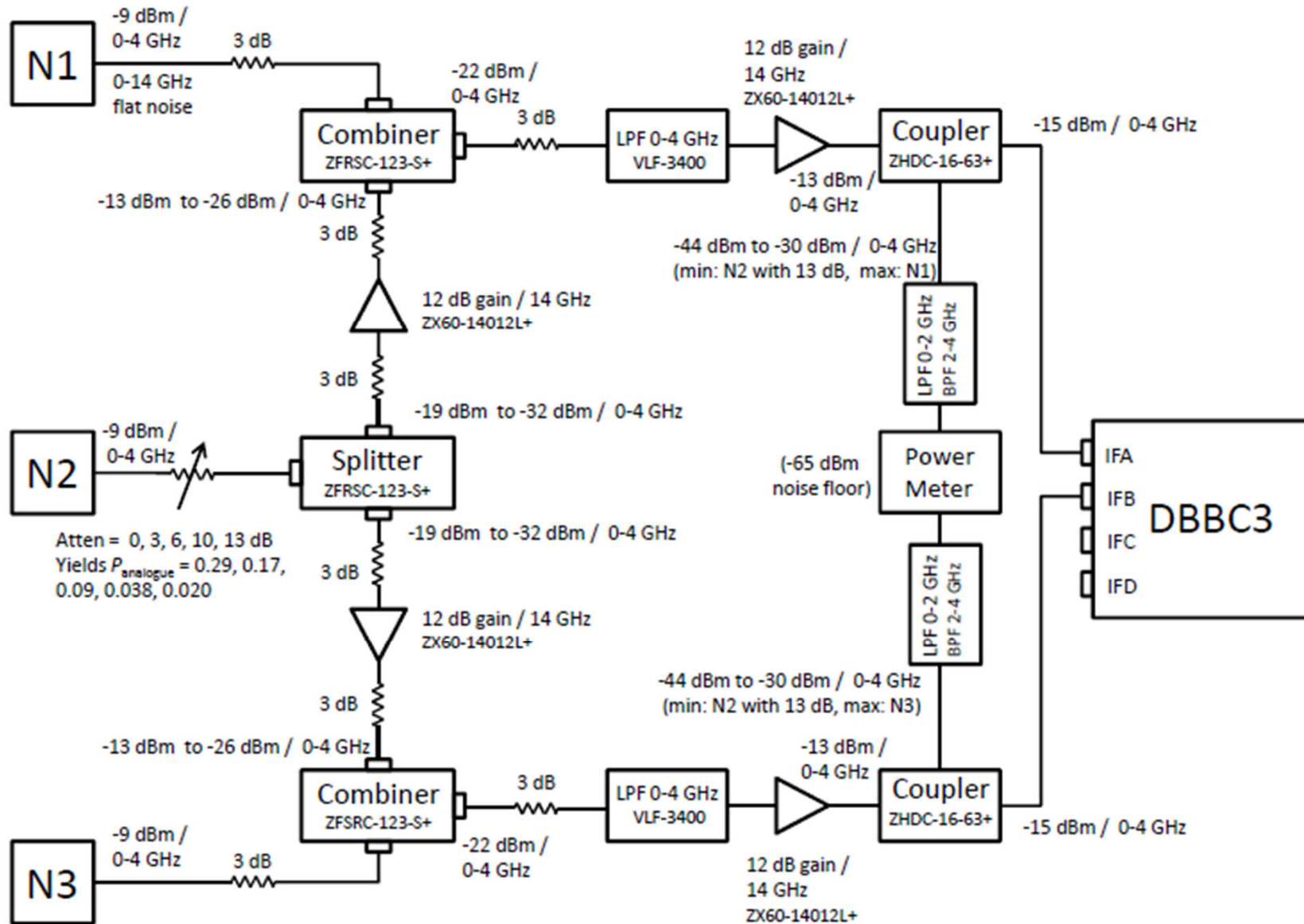


Efficiency of each backend: 90 % to 93 %

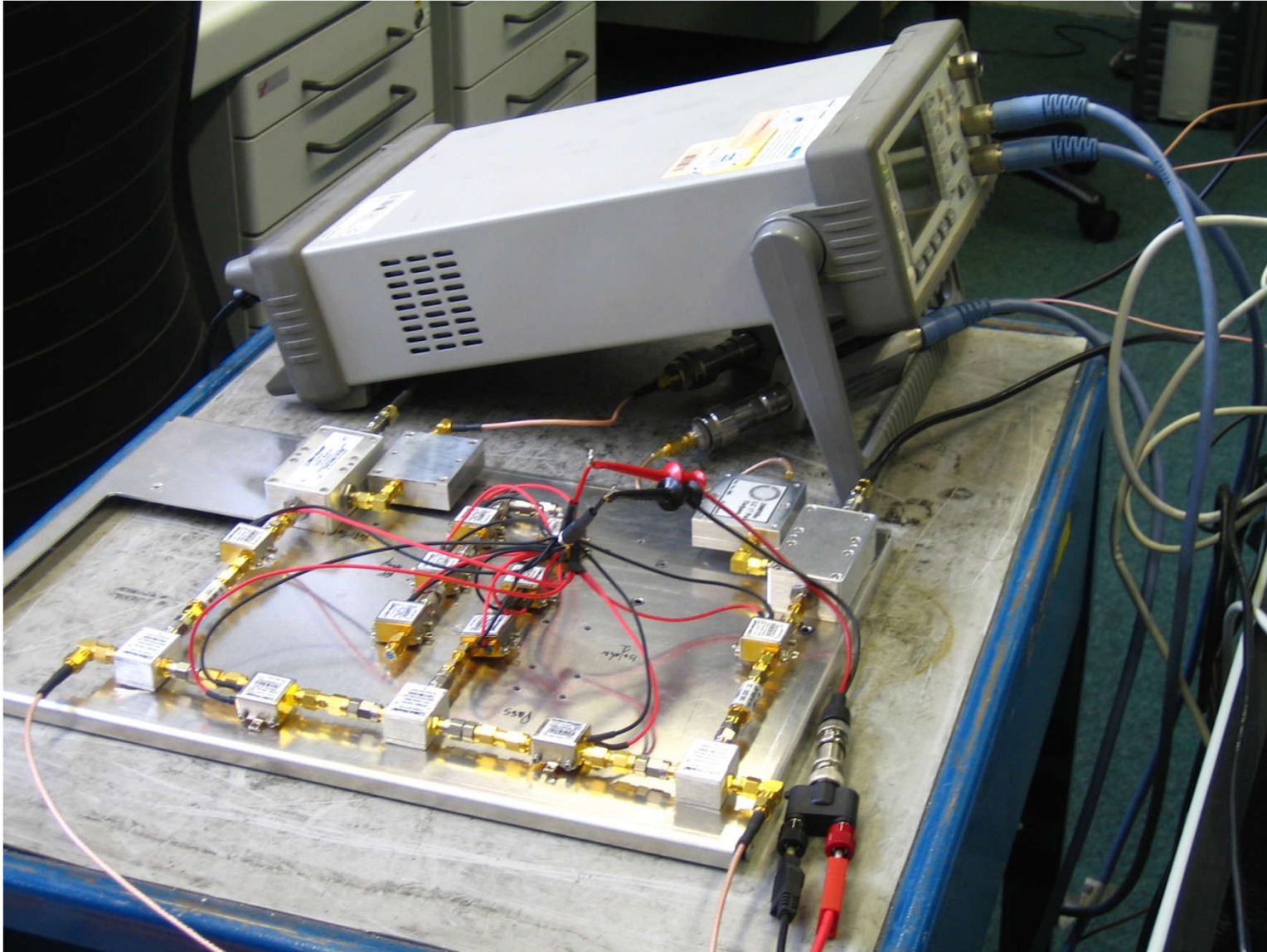
Analogue Signal Preparation: 2018 Aug-Sep



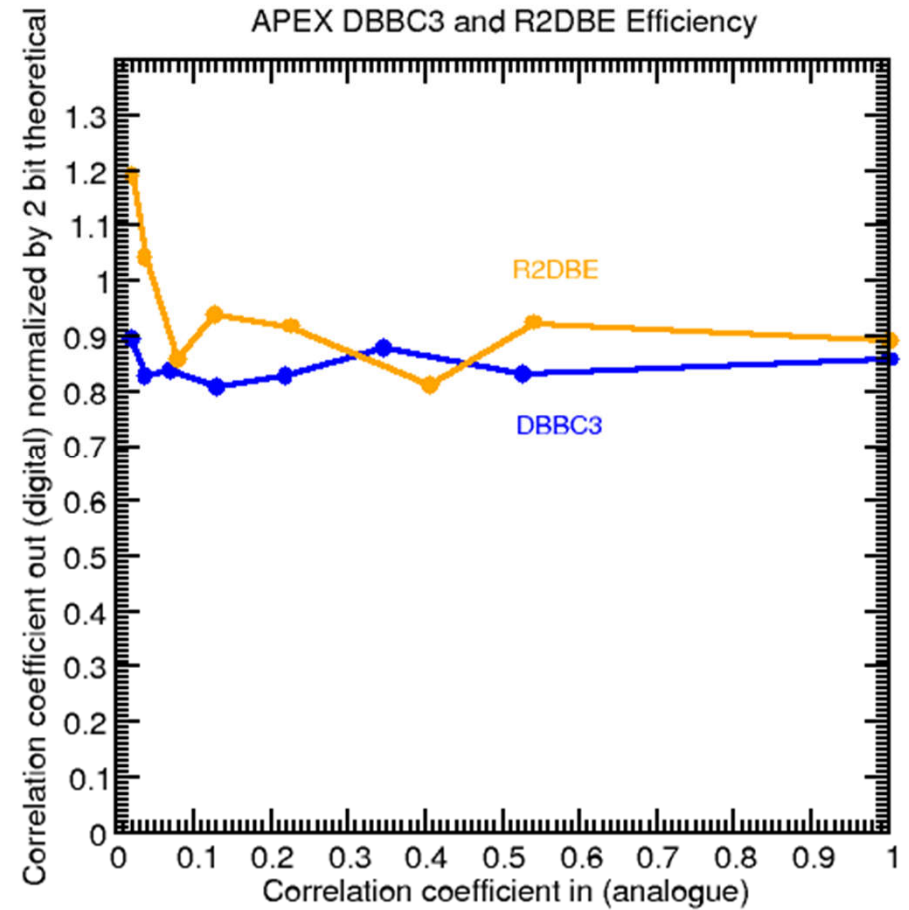
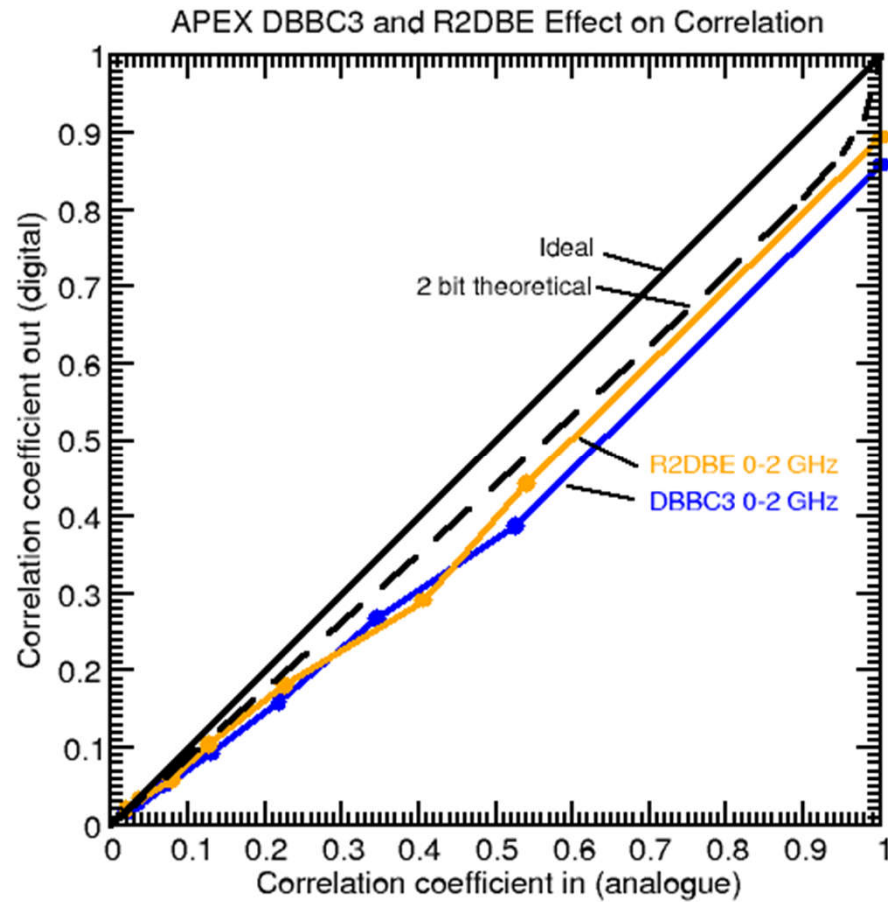
Analogue Signal Preparation: 2018 Oct-Nov



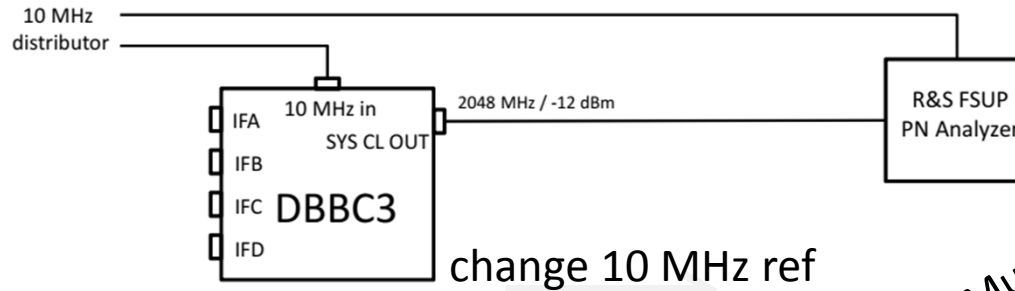
Analogue Signal Preparation: 2018 Oct-Nov



Zero Baseline Test



ORA#27 Timing Stability: Sampler Clock

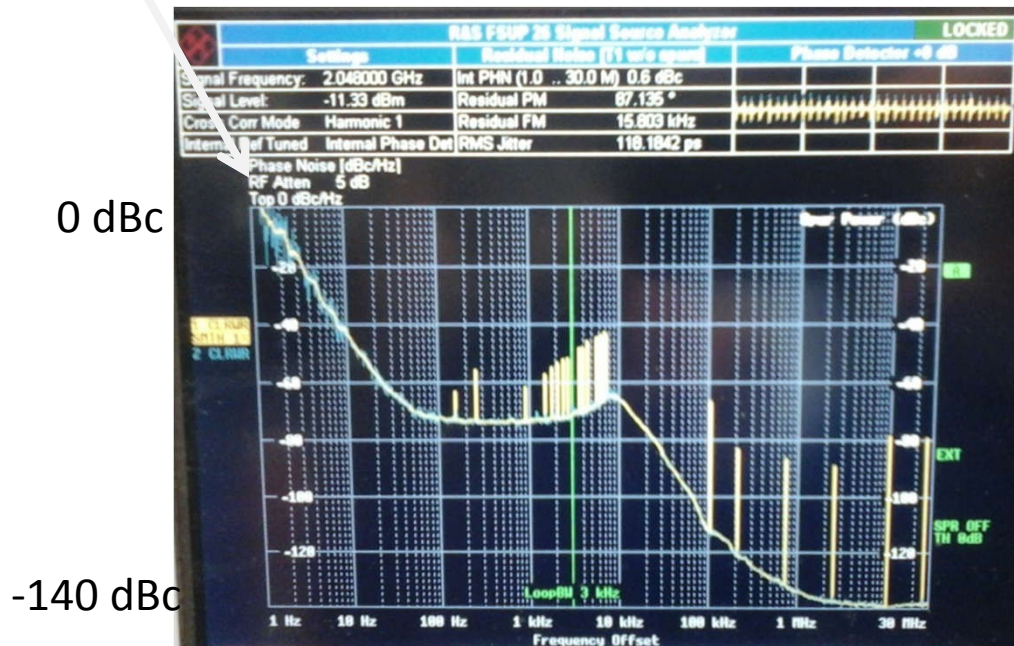


Excess close-in PN

Much less close-in PN

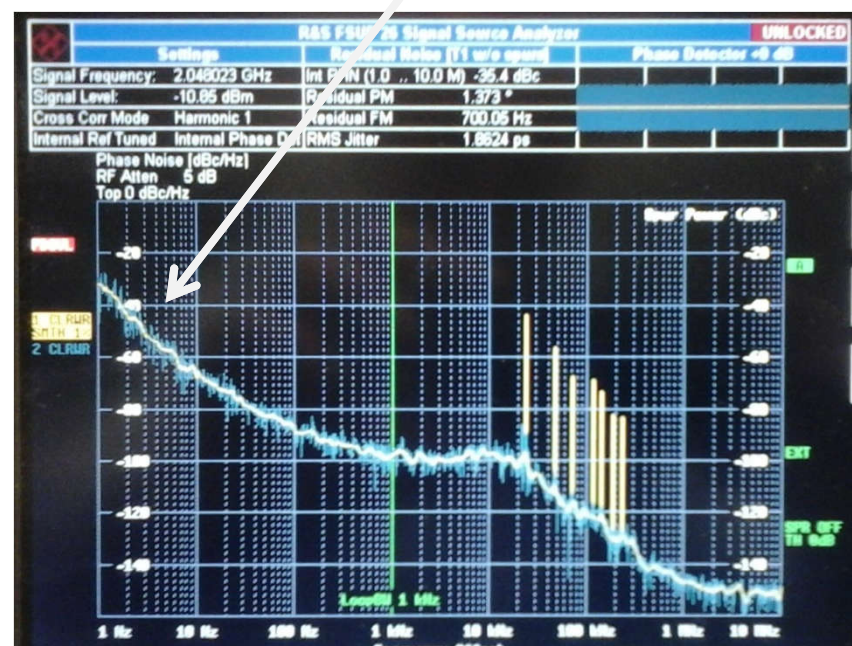
2048 MHz Clock using Lab 10 MHz Ref

2048 MHz Clock using Wiltron 10 MHz Ref



1 Hz 30 MHz

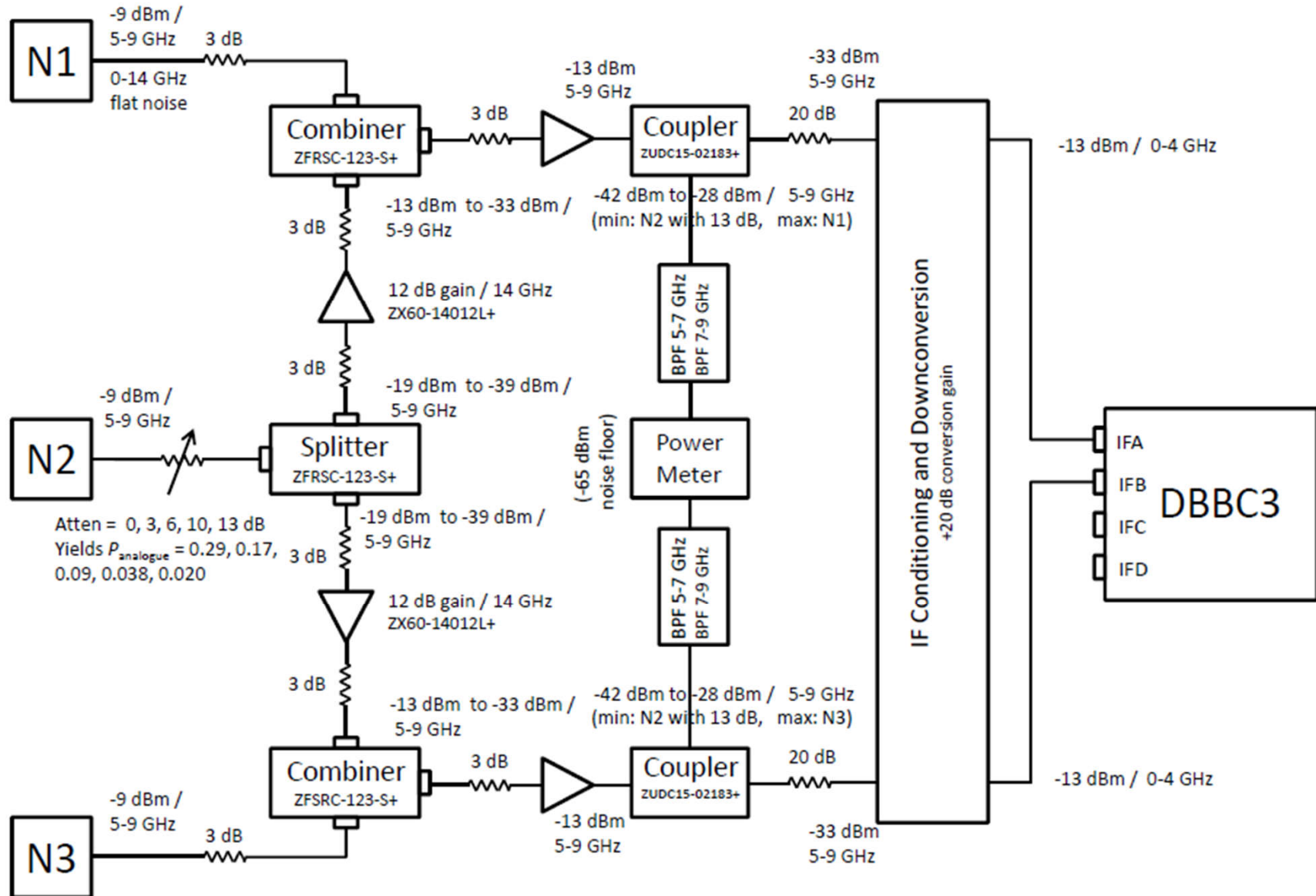
87° RMS random phase jitter(!!!)



1 Hz 30 MHz

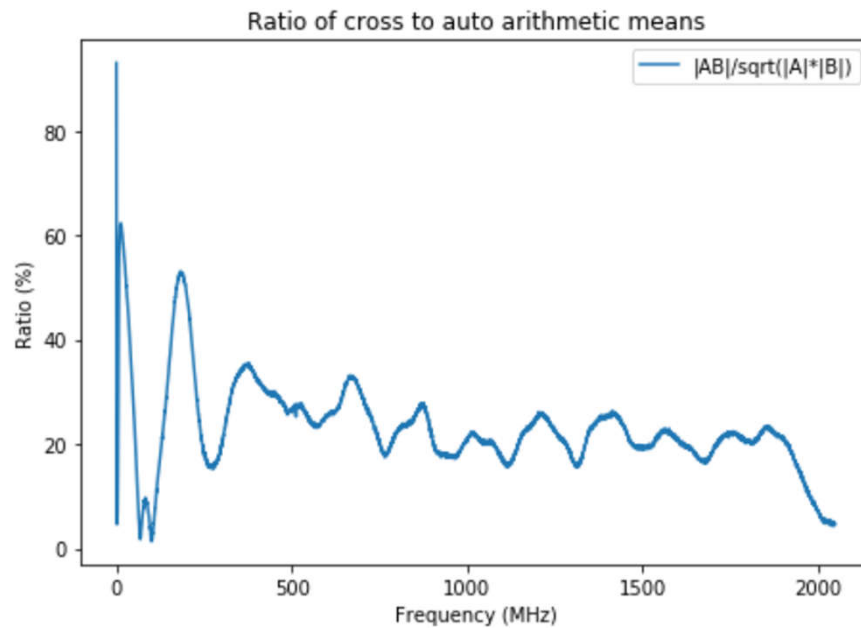
1.9° RMS random phase jitter

Analogue Signal Preparation: 2018 Oct-Nov

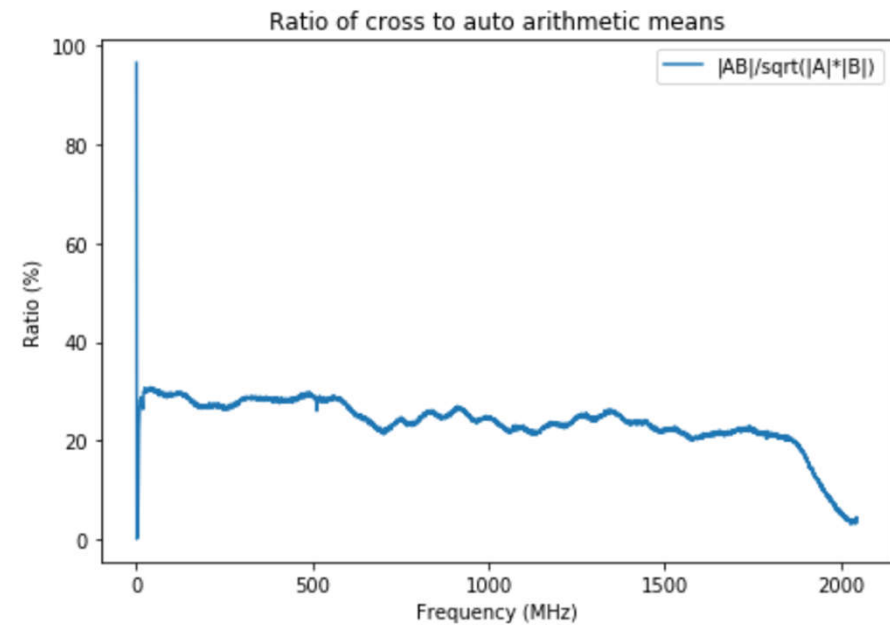


ORA#(35) Bandpass Ripple

- Improved component selection in analogue combiner

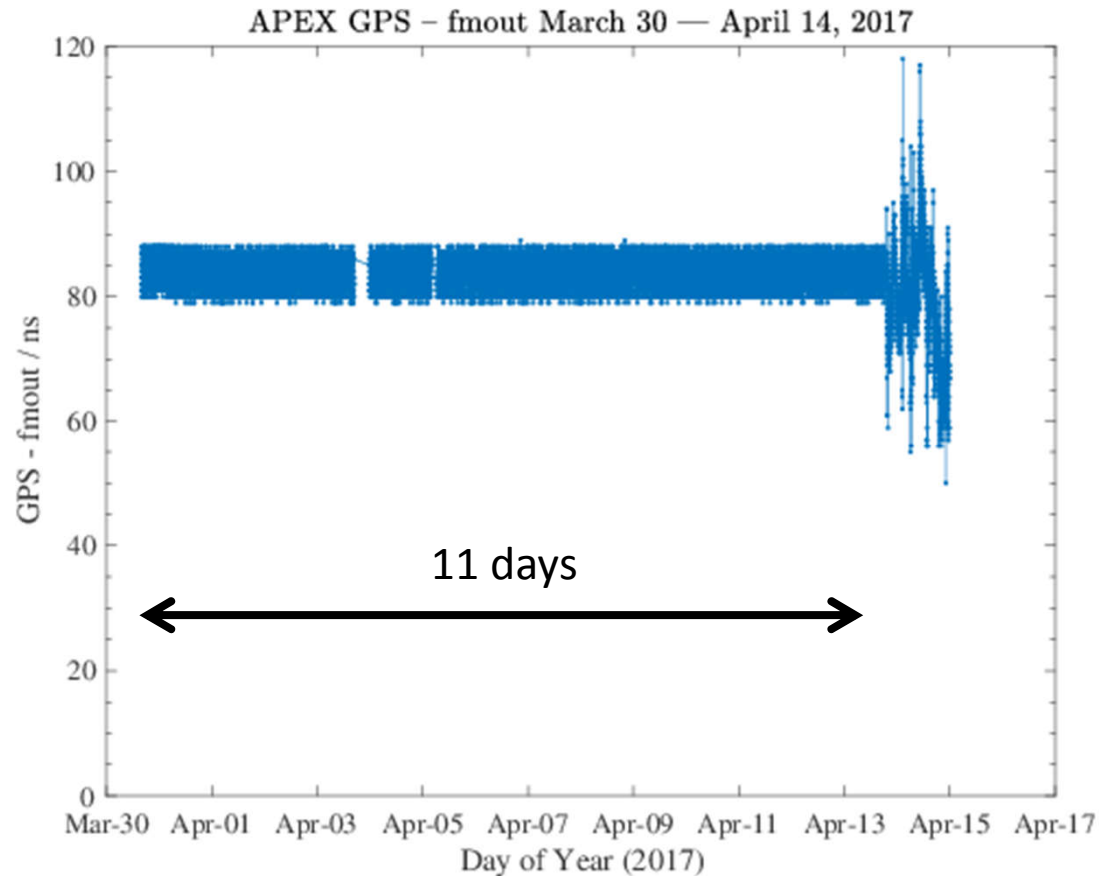


2018 Sep



2018 Nov 05

ORA#1 Too-Stable 1 PPS GPS-FMOUT



- Cause: firmware performs re-sync each second on 1 PPS input
- Fix: 2-line change in firmware, recompilation not stable (Xilinx ISE issue; need PlanAhead)

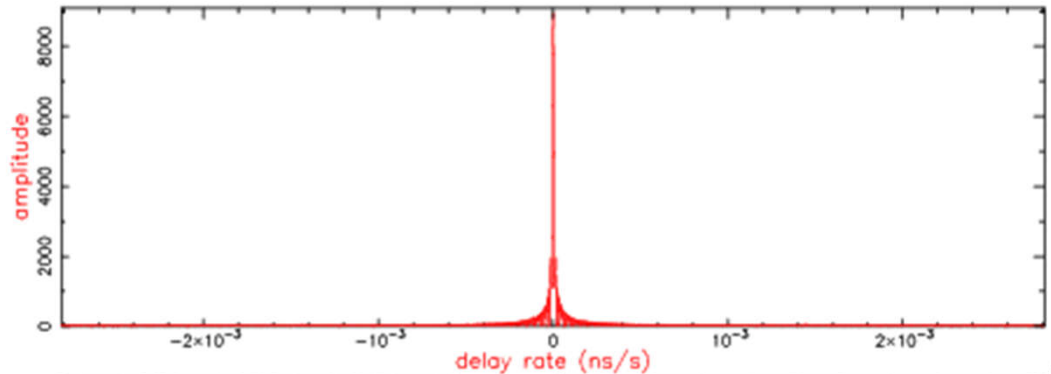
On-Sky Fringe Test EHT Oct 345 GHz

Mk4/DIFX fourfit 3.17 rev 2160

BLLAC.0CNA88, No0006, tu
APEX - APEX_DBB, fgroup B, pol LL

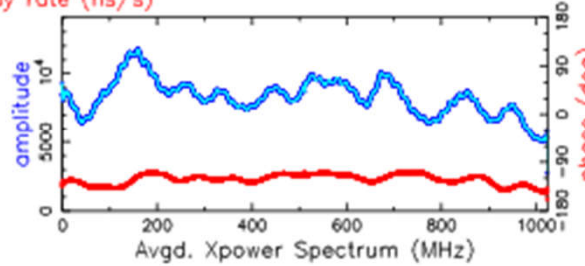
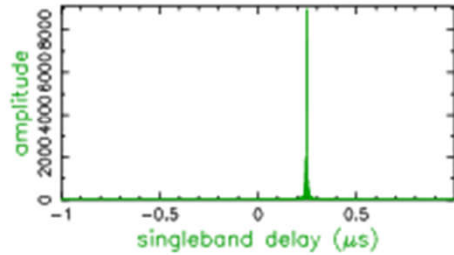
R2DBE – DBBC3

zero-baseline



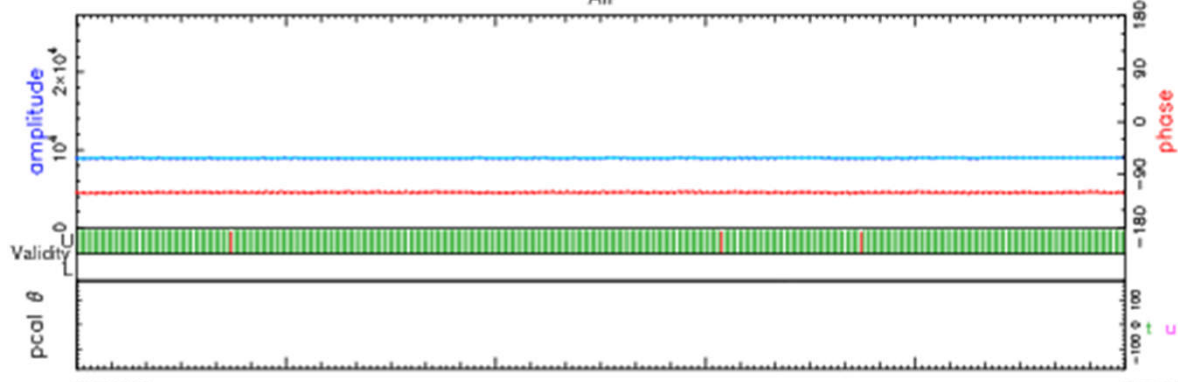
Fringe quality 9
Error code H
SNR 608341.6
Int time 299.187
Amp 9094.173
Phase -120.2
PFD 0.0e+00
Delays (us)
SBD 0.246486
MBD -0.000001
Fringe rate (Hz)
-0.000045
Ion TEC 0.000
Ref freq (MHz)
347067.0000
AP (sec) 0.512

Amp = 9094 whitneys
= 90.94 %



Exp. e18p17
Exper # 16383
Yr.day 2018:290
Start 004600.00
Stop 005100.03
FRT 004830.00
Corr/FF/build
2018:303:120709
2018:303:121743
2018:190:101608
RA & Dec (J2000)
22h02m43.2914s
+42°16'39.980"

Amp. and Phase vs. time for each freq., 293 segs, 2 APs / seg (1.02 sec / seg.), time ticks 2 sec
All



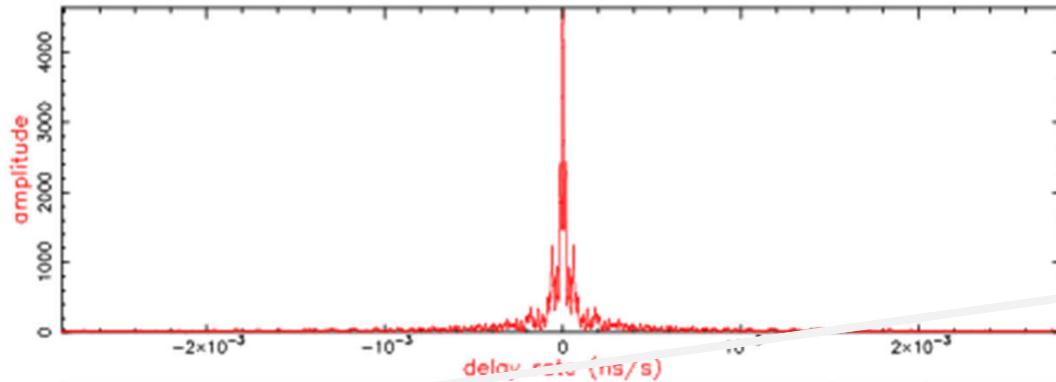
On-Sky Fringe Test EHT Oct 345 GHz

Mk4/DIFX fourfit 3.19 rev 2512

J0423-0120.0CNA7F, 294-0922, tu
APEX - APEX_DBB, fgroup B, pol LL

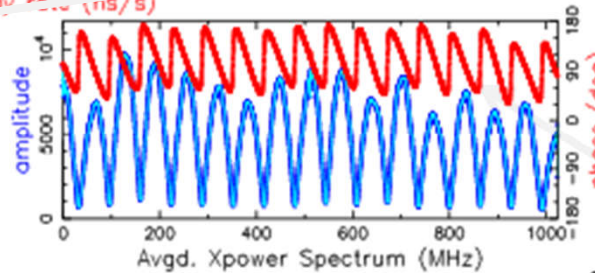
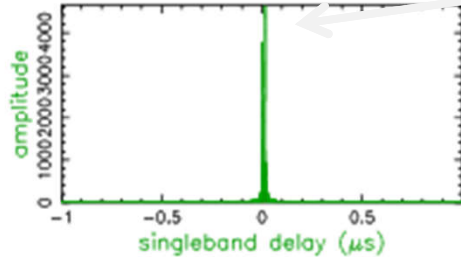
R2DBE – DBBC3

zero-baseline

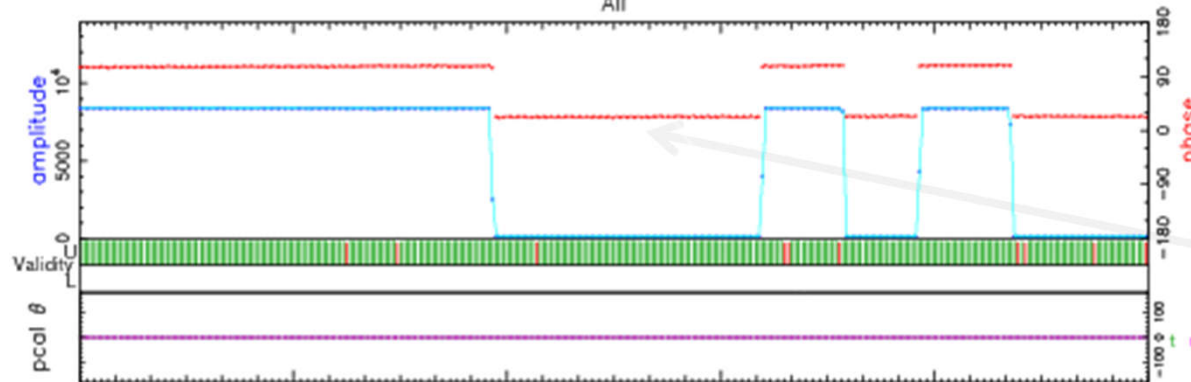


Fringe quality 5
Error code H
SNR 309442.6
Int time 297.475
Amp 4639.193
Phase 106.3
PFD 0.0e+00
Delays (us)
SBD 0.016408
MBD -0.000001
Fringe rate (Hz)
-0.000002
TEC 0.000
Ref freq (MHz)
347067.0000
AP (sec) 0.512
Exp. e18s21
Exper # 3669
Yr/day 2018:294
Start 092200.00
Stop 092700.03
FRT 092430.00
Corr/FF/build
2018:303:1 02620
2018:303:1 21417
2018:249:09 1612
RA & Dec (J2000)
04h23m15.800727s
-1°20'33.065552"

SBD twin peaks



Amp. and Phase vs. time for each freq., 293 segs, 2 APs / seg (1.02 sec / seg.), time ticks 2 sec
All



16 cycles beating at 4096 MSps
-> 1/ 256 MHz delay slip
CORE3 clock = 256 MHz

Amp -> zero intermittently,
phase jump

Cause: Re-syncing on 1 PPS, firmware fixed, not yet stable