Description

Test of DBBC2 fullband mode to be used when co-observing with ALMA.

Participating stations:

	Log	Prc
Ef	t162aef.log	t162aef.prc
On	t162aon.log	t162aon.prc
Yb	t162ays.log	t162ays.prc
Mh	t162amh.log	t162amh.prc

Notes

- Ys had trouble with flexbuf recording in the beginning of the test. Data was recorded for scans 7-9 only. Inspection of the transferred files with vsum and other VDIF tools revealed problems in decoding the data. Reason needs to be investigated. So far no valid data from Ys.
- Mh had very bad weather during the whole test.

- Efffesberg did parallel recording with RDBE system (Eb). VDIF data is stored on module MPI+1621. RDBE was configured for DDC mode (2nd Nyquist zone).

Results

Effelsberg zero-baseline correlation

O-baseline correlation using zerocorr

Some test data was taken using the t162a setting prior to the observations. Test data was named full_ef_no006 (DBBC full band mode) and full_eb_no0006 (RDBE 4x128 MHz). The channel settings are:

```
$FREQ;
*
def 86140.00MHz4x128MHz;
* mode =  1    stations =Eb
    sample_rate = 256.000 Ms/sec;  * (2bits/sample)
    chan_def = : 86140.00 MHz : U : 128.00 MHz : &CH01 : &BBC01 : &U1Cal; *Rcp
    chan_def = : 86140.00 MHz : U : 128.00 MHz : &CH02 : &BBC02 : &U1Cal; *Lcp
    chan_def = : 86268.00 MHz : U : 128.00 MHz : &CH03 : &BBC03 : &U2Cal; *Rcp
    chan_def = : 86268.00 MHz : U : 128.00 MHz : &CH04 : &BBC04 : &U2Cal; *Lcp
enddef;
*
def 86524.00MHz2x512MHz;
* mode =  1    stations =Ef:On:Ys:Mh
    sample_rate = 1024.000 Ms/sec;  * (2bits/sample)
    chan_def = : 86524.00 MHz : L : 512.00 MHz : &CH01 : &BBC01 : &NoCal; *Rcp
```

```
    chan_def = : 86524.00 MHz : L : 512.00 MHz : &CH02 : &BBC02 : &NoCal; *Lcp
enddef;
```

The data from the DBBC was recorded on the Mark6 combining both VSI data streams are combined and written as interleaved single threaded VDIF data with 8000 bytes packages. VDIF_8000-4096-2-2.

The data from the RDBE was recorded on the Mark5C in multi-threaded VDIF data with 5032 bytes per frame. Below an example how to convert this with vmux to single threaed data VDIF_20000-1024-4-2.

```
oper@eff-mark5c-1:~$ vdifbstate full_eb_no0006.m5a 5032 1024 0,1,2,3 500
Executing: vmux full_eb_no0006.m5a 5032 6400 0,1,2,3 - 0 | m5bstate - VDIF_20000-1024-4-2 500
Mark5 stream: 0x92960c0
  stream = File-1/1=<stdin>
  format = VDIF_20000-1024-4-2 = 3
  start mjd/sec = 57660 29686.000000000
  frame duration = 156250.00 ns
  framenum = 0
  sample rate = 128000000 Hz
  offset = 0
  framebytes = 20032 bytes
  datasize = 20000 bytes
  sample granularity = 1
  frame granularity = 1
  gframens = 156250
  payload offset = 32
  read position = 0
  data window size = 524288 bytes
10000000 / 10000000 samples unpacked

Ch   --      -     +     ++       --      -     +     ++     gfact
 0 1698169 3306628 3311096 1684107     17.0  33.1  33.1  16.8  1.05
 1 1694346 3311571 3311592 1682491     16.9  33.1  33.1  16.8  1.05
 2 1698207 3309868 3304658 1687267     17.0  33.1  33.0  16.9  1.05
 3 1693271 3305839 3319599 1681291     16.9  33.1  33.2  16.8  1.05
```

The convereted single threaded data can then be correlated with zerocorr in zoom band mode. Below some plots and the zerocorr parameter files to process the data.

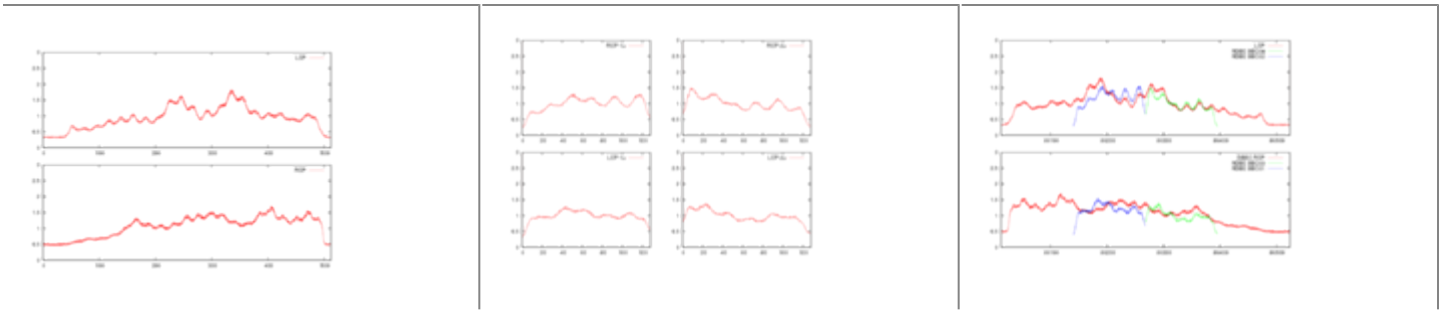


Fig. 1 DBBC auto correlation	**Fig. 2** RDBE auto correlation	**Fig. 3** RDBE and DBBC autocorrelation combined

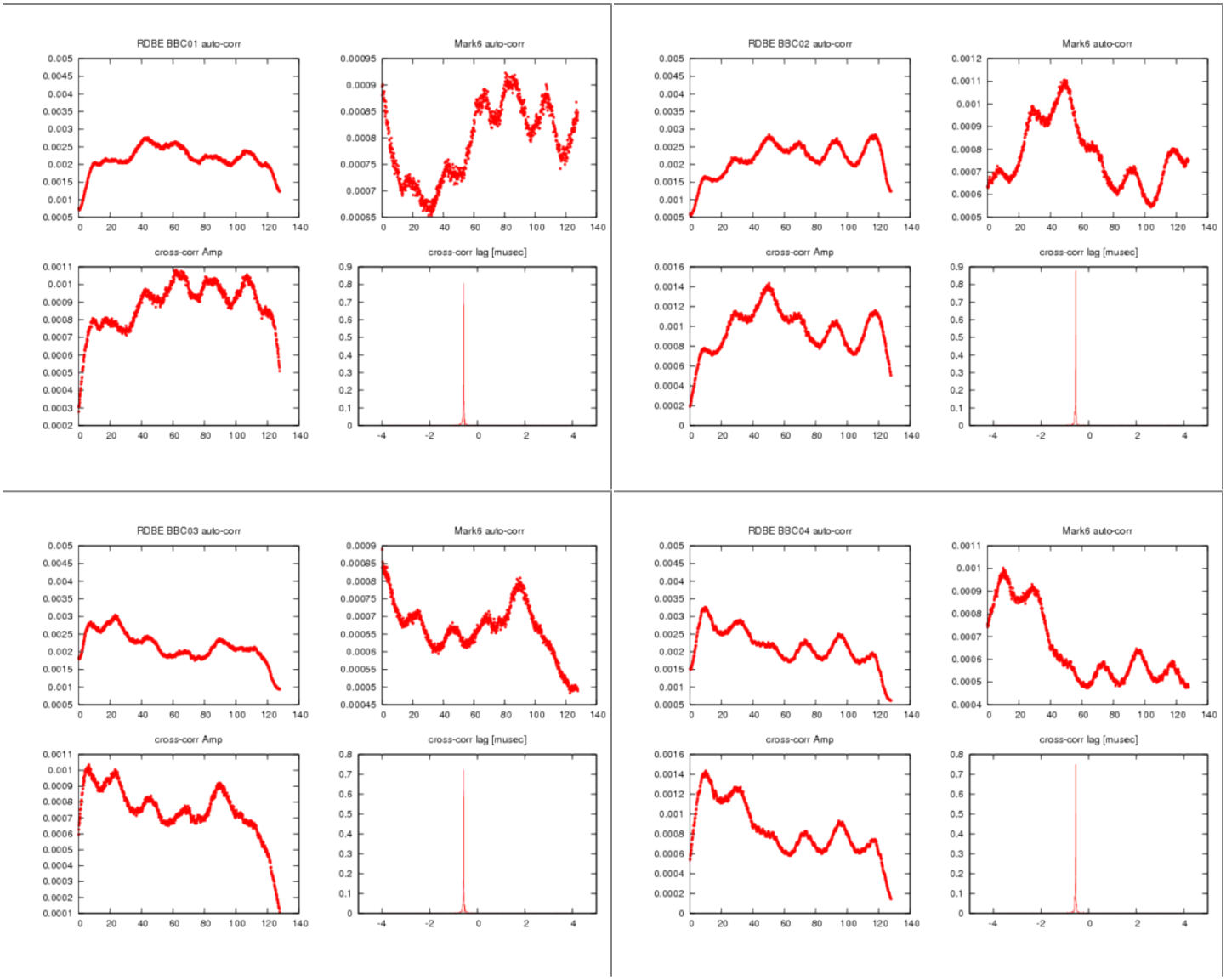
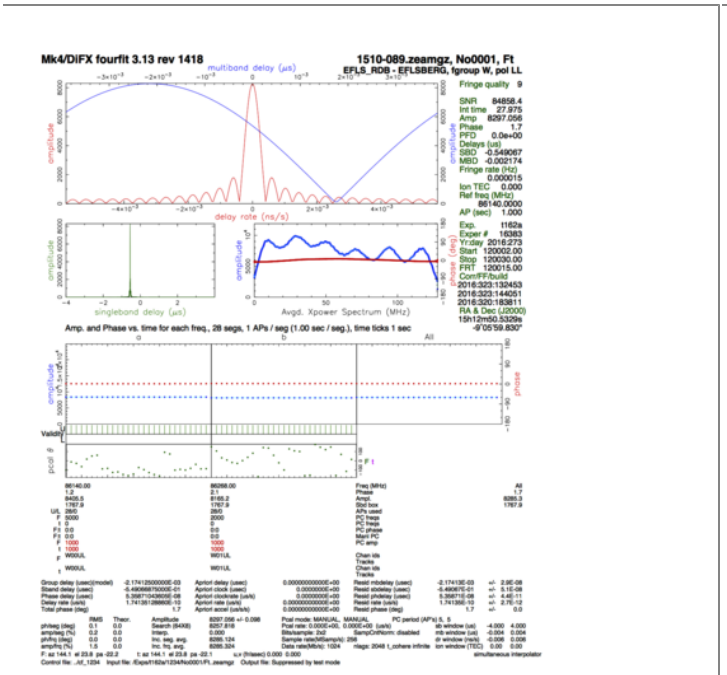
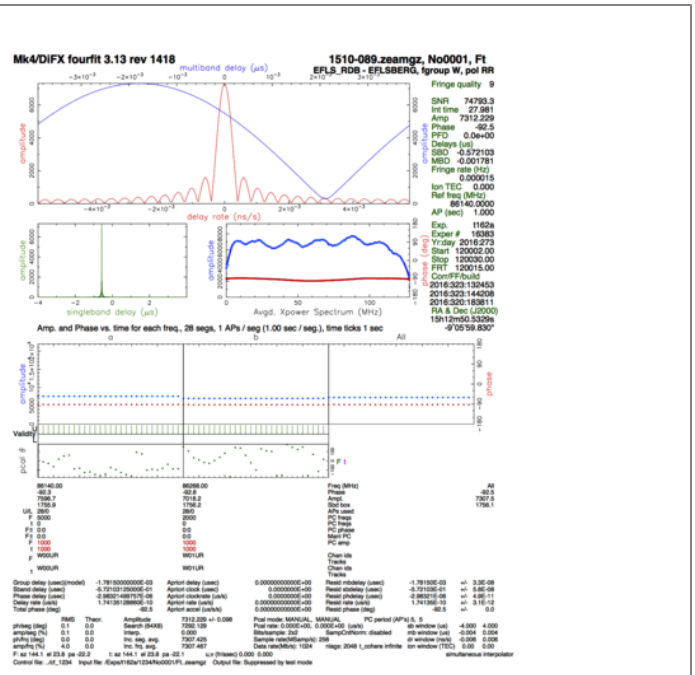


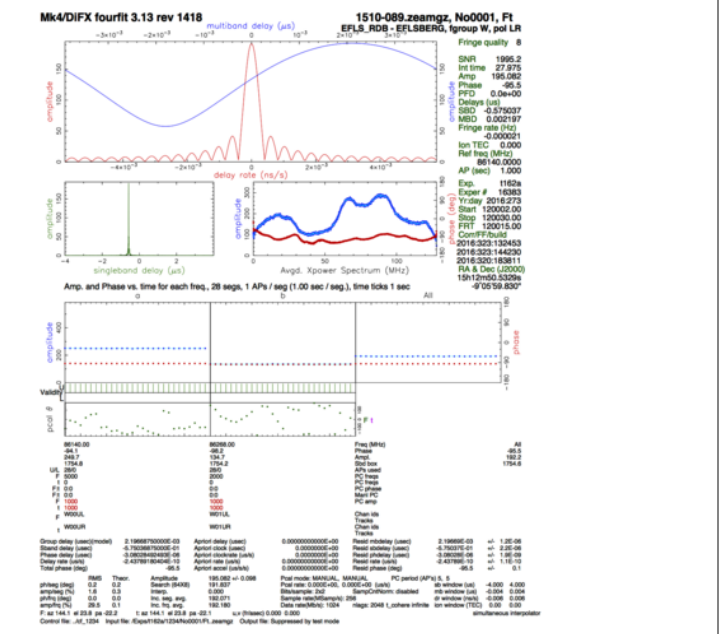
Fig. 4 DBBC and RDBE BBCs zoom band cross correlations

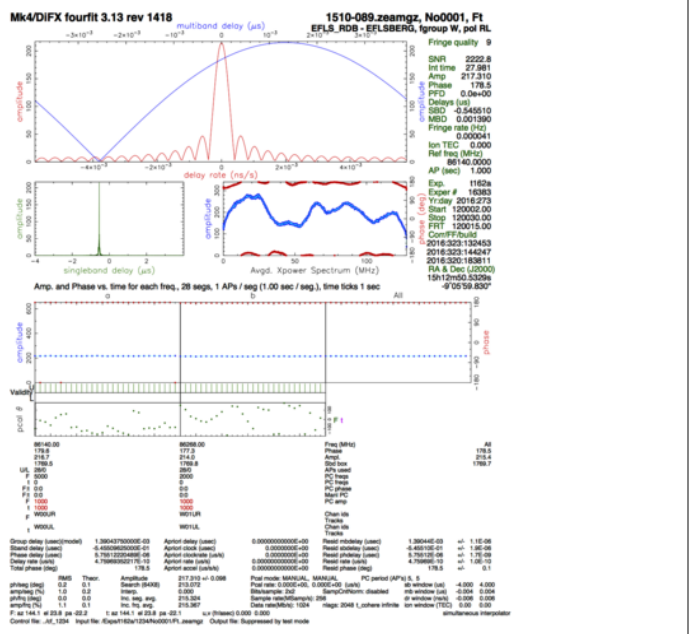
0-baseline correlation using DiFX

The 0-baseline data was also processed with the MPIfR DiFX correlator yielding the same results as shown above.









Correlation (On,Eb,Ef,Mh,Ys)

No fringes found except on the zero-baseline between Eb and Ef (see above). The Ys data could not be decoded at all.

See the memo by Dave Graham for details.

Conclusions

The fullband mode of the DBBC2 has been demonstrated to work properly. Also the required bitstream reordering done by the FiLA10G works as expected.

Prior to the March/April 2017 run a working setup needs to be established at all the DBBC2 stations so further test runs are needed.