

$$\Gamma[m] = \sum_{n=0}^{N-1} f[(n+m) \bmod N] g^*[n] = \sum_{k=0}^{N-1} F[k] G^*[k] e^{i2\pi km/N} \quad \checkmark$$

```
$> cd /home/workshop23/n2412/
```

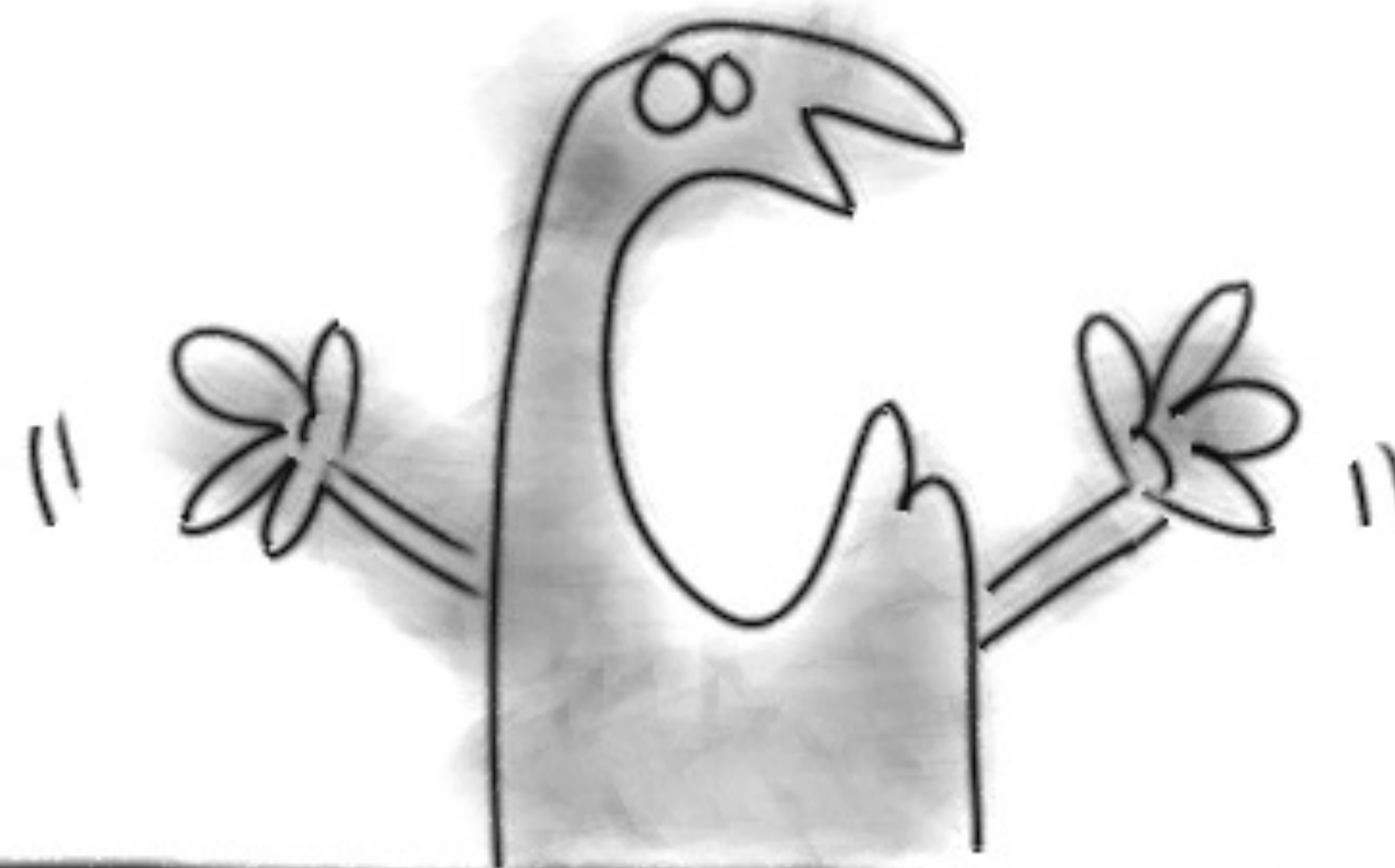
```
$> cd /home/workshop23/n2412/
```

```
$> ls -l
```

```
total 1268
```

-rw-r--r--	1	781649	Sep	5	18:11	N24L2_No0004.cor
-rw-r--r--	1	1110	Sep	5	16:43	N24L2_No0004.ctrl
-rw-r--r--	1	390929	Sep	5	16:43	N24L2_No0005.cor
-rw-r--r--	1	1124	Sep	5	16:43	N24L2_No0005.ctrl
-rw-r--r--	1	51051	Sep	5	16:43	N24L2_No0005.log
drwxr-xr-x	2	4096	Sep	5	16:46	delays
-rw-r--r--	1	46394	Sep	5	16:43	n2412.vix

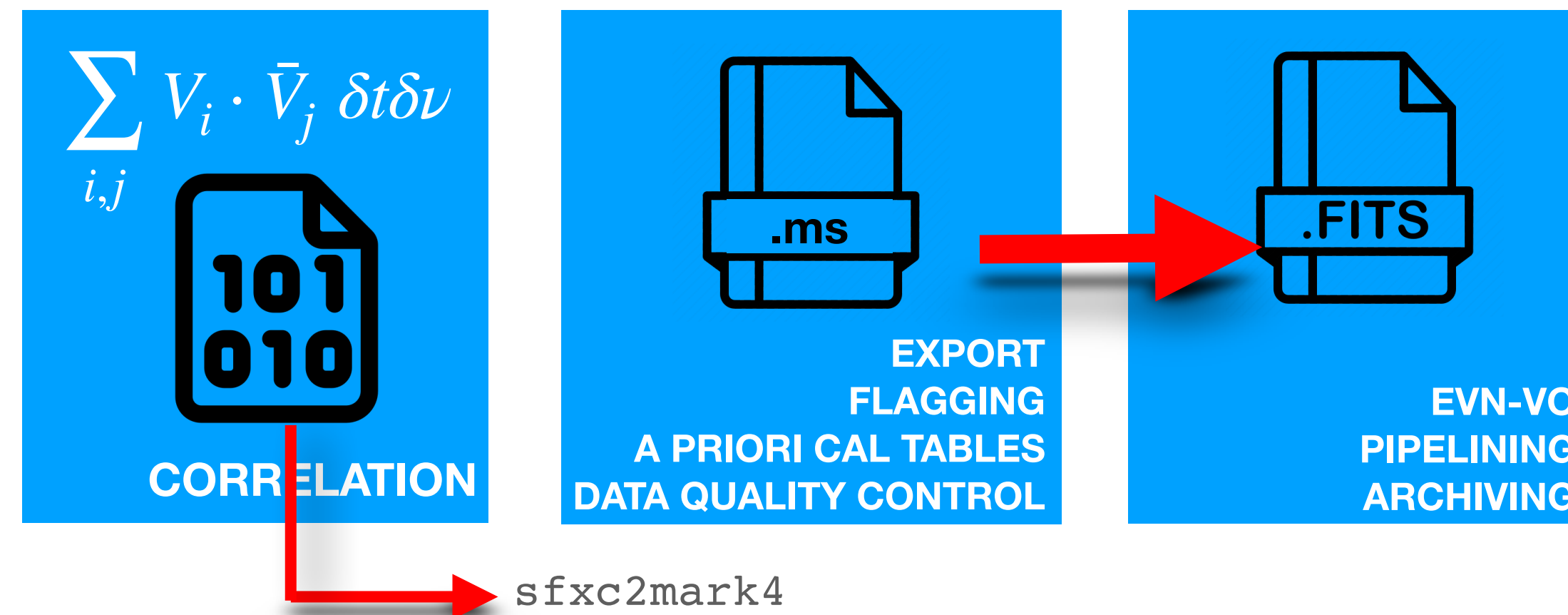
Now What?!!



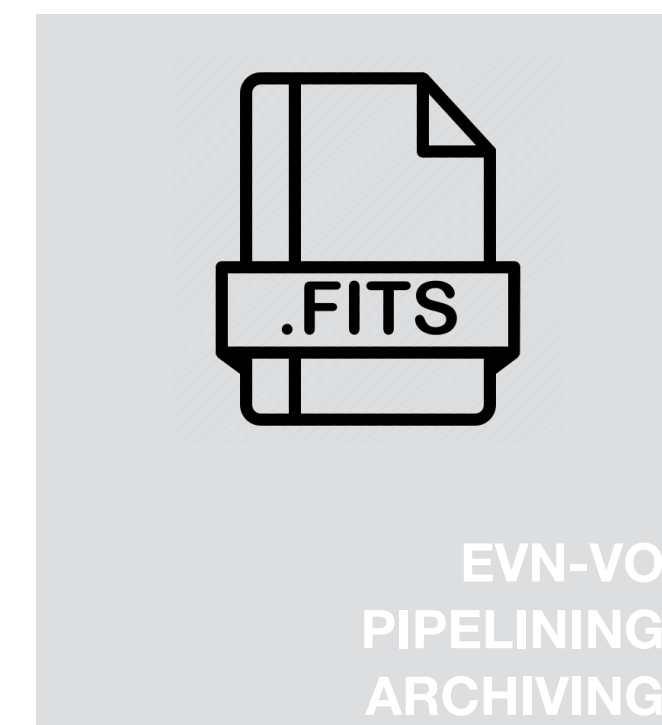
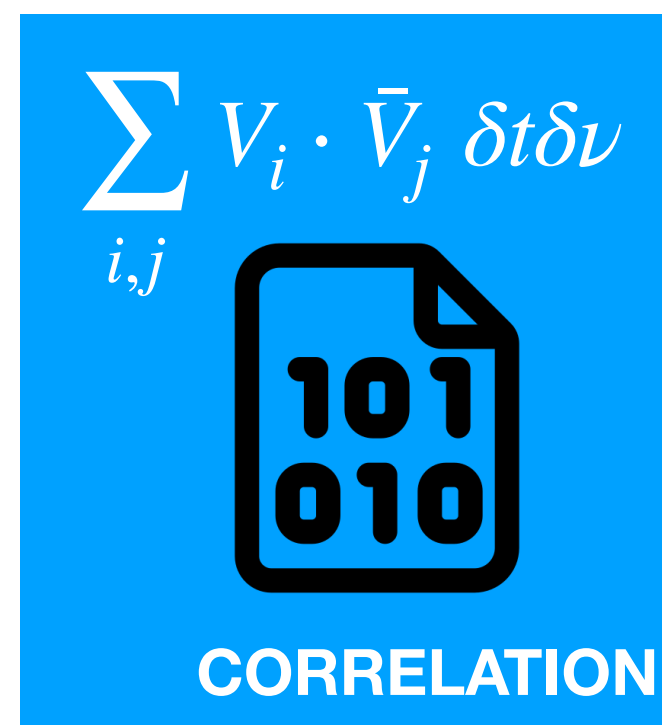
Post-correlation workflow

<https://indico.astron.nl/event/410/contributions/3528/>

Background

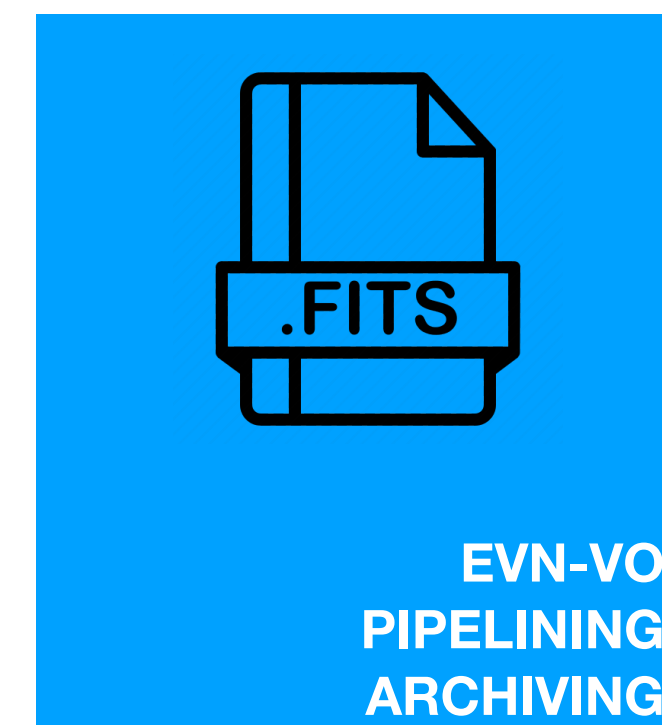
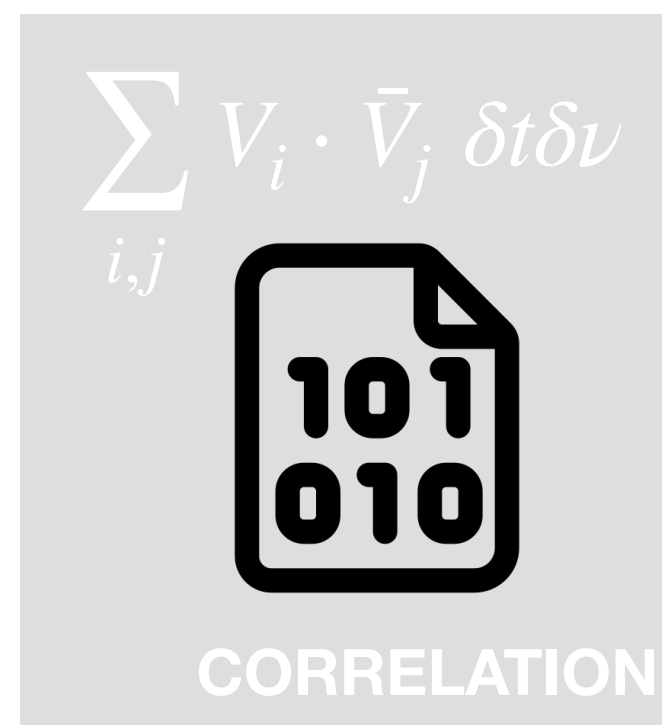


Background



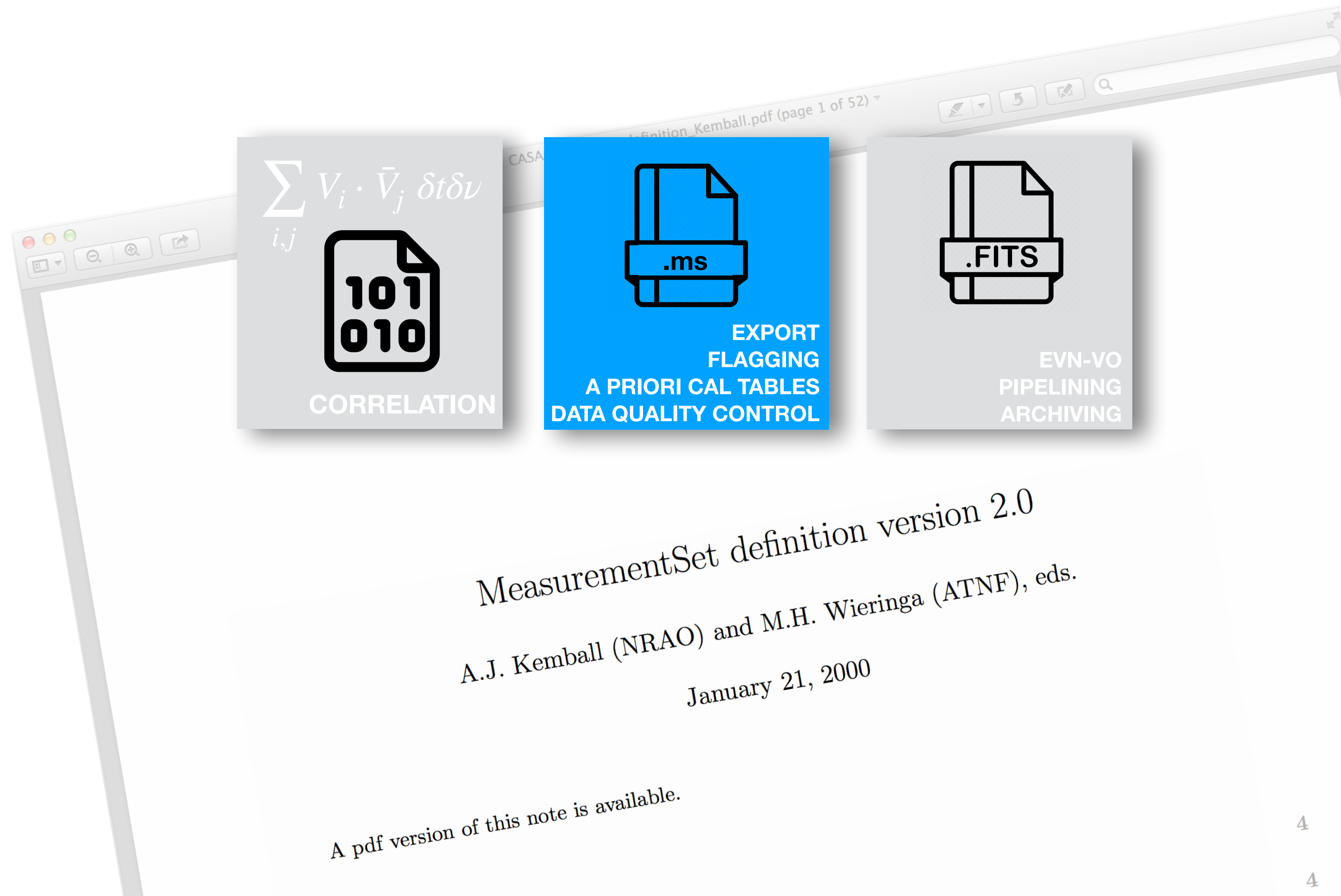
Correlator Output
(own format)

Background

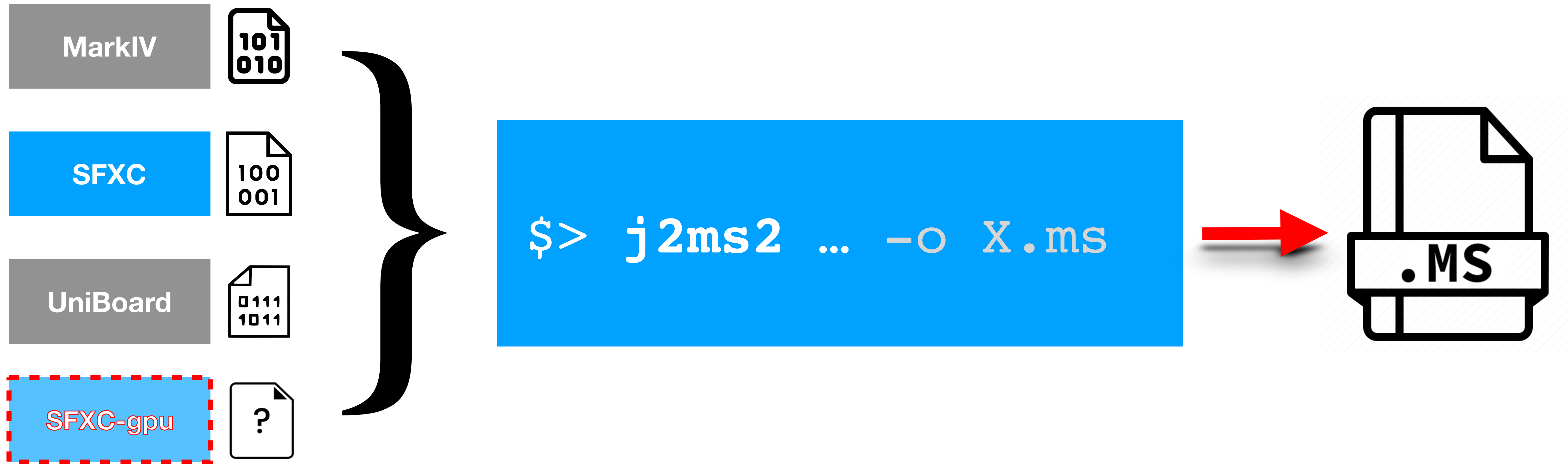


EVN Archive content
(FITS-IDI)

Background



Background



 Decommissioned correlator
 Actively supported
 In progress

<https://code.jive.eu/verkout/jive-casa>

Creating a MeasurementSet

```
$> ls -l
total 1268
-rw-r--r--  1  781649 Sep  5 18:11 N24L2_No0004.cor
-rw-r--r--  1    1110 Sep  5 16:43 N24L2_No0004.ctrl
-rw-r--r--  1 390929 Sep  5 16:43 N24L2_No0005.cor
-rw-r--r--  1    1124 Sep  5 16:43 N24L2_No0005.ctrl
-rw-r--r--  1   51051 Sep  5 16:43 N24L2_No0005.log
drwxr-xr-x  2    4096 Sep  5 16:46 delays
-rw-r--r--  1   46394 Sep  5 16:43 n24l2.vix
```


Creating a MeasurementSet

```
$> ls -l
total 1268
-rw-r--r--  1  781649 Sep  5 18:11 N24L2_No0004.cor
-rw-r--r--  1    1110 Sep  5 16:43 N24L2_No0004.ctrl
-rw-r--r--  1 390929 Sep  5 16:43 N24L2_No0005.cor
-rw-r--r--  1    1124 Sep  5 16:43 N24L2_No0005.ctrl
-rw-r--r--  1   51051 Sep  5 16:43 N24L2_No0005.log
drwxr-xr-x  2    4096 Sep  5 16:46 delays
-rw-r--r--  1   46394 Sep  5 16:43 n24l2.vix
```

Creating a MeasurementSet

```
$> ls -l
total 1268
-rw-r--r--  1  781649 Sep  5 18:11 N24L2_No0004.cor
-rw-r--r--  1    1110 Sep  5 16:43 N24L2_No0004.ctrl
-rw-r--r--  1 390929 Sep  5 16:43 N24L2_No0005.cor
-rw-r--r--  1    1124 Sep  5 16:43 N24L2_No0005.ctrl
-rw-r--r--  1   51051 Sep  5 16:43 N24L2_No0005.log
drwxr-xr-x  2    4096 Sep  5 16:46 delays
-rw-r--r--  1   46394 Sep  5 16:43 n24l2.vix
```

Creating a MeasurementSet

```
$FREQ;  
def 1610.49MHz16x16MHz;  
    sample_rate = 32 Ms/sec;  
    chan_def =      : 1610.4900 MHz : L : 16 MHz : &CH01 : &BBC02 : &NoCal;  
    chan_def =      : 1610.4900 MHz : L : 16 MHz : &CH02 : &BBC01 : &NoCal;  
    chan_def =      : 1610.4900 MHz : U : 16 MHz : &CH03 : &BBC02 : &NoCal;  
    chan_def =      : 1610.4900 MHz : U : 16 MHz : &CH04 : &BBC01 : &NoCal;  
    chan_def =      : 1642.4900 MHz : L : 16 MHz : &CH05 : &BBC04 : &NoCal;  
    chan_def =      : 1642.4900 MHz : L : 16 MHz : &CH06 : &BBC03 : &NoCal;  
    chan_def =      : 1642.4900 MHz : U : 16 MHz : &CH07 : &BBC04 : &NoCal;  
    chan_def =      : 1642.4900 MHz : U : 16 MHz : &CH08 : &BBC03 : &NoCal;  
    chan_def =      : 1674.4900 MHz : L : 16 MHz : &CH09 : &BBC06 : &NoCal;  
    chan_def =      : 1674.4900 MHz : L : 16 MHz : &CH10 : &BBC05 : &NoCal;  
    chan_def =      : 1674.4900 MHz : U : 16 MHz : &CH11 : &BBC06 : &NoCal;  
    chan_def =      : 1674.4900 MHz : U : 16 MHz : &CH12 : &BBC05 : &NoCal;  
    chan_def =      : 1706.4900 MHz : L : 16 MHz : &CH13 : &BBC08 : &NoCal;  
    chan_def =      : 1706.4900 MHz : L : 16 MHz : &CH14 : &BBC07 : &NoCal;  
    chan_def =      : 1706.4900 MHz : U : 16 MHz : &CH15 : &BBC08 : &NoCal;  
    chan_def =      : 1706.4900 MHz : U : 16 MHz : &CH16 : &BBC07 : &NoCal;  
enddef;
```


Creating a MeasurementSet

```
def PICKMERE;
    site_ID = Pi;
    site_position = 3817549.63607 m : -163030.67453 m : 5089896.90874 m;
enddef;
def TORUN;
    site_ID = Tr;
    site_position = 3638558.07147 m : 1221970.17058 m : 5077036.96598 m;
enddef;
def WSTRBORK;
    site_ID = Wb;
    site_position = 3828750.32630 m : 442589.68434 m : 5064921.80912 m;
enddef;

def EFLSBERG;
    axis_offset = 1.31000000e-2 m;
    axis_type = az:el;
enddef;
def HART;
    axis_offset = 6.6934000 m;
    axis_type = ha:dec;
enddef;
def IRBENE;
    axis_offset = 0.00000000e+0 m;
    axis_type = az:el;
enddef;
```

Creating a MeasurementSet

```
def PICKMERE;
    site_ID = Pi;
    site_position = 3817549.63607 m : -163030.67453 m : 5089896.90874 m;
enddef;
def TORUN;
    site_ID = Tr;
    site_position = 3638558.07147 m : 1221970.17058 m : 5077036.96598 m;
enddef;
def WSTRBORK;
    site_ID = Wb;
    site_position = 3828750.32630 m : 442589.68434 m : 5064921.80912 m;
enddef;

def EFLSBERG;
    axis_offset = 1.3100000e-2 m;
    axis_type = az:el;
enddef;
def HART;
    axis_offset = 6.6934000 m;
    axis_type = ha:dec;
enddef;
def IRBENE;
    axis_offset = 0.0000000e+0 m;
    axis_type = az:el;
enddef;
```


Creating a MeasurementSet

```
$> ls -l
total 1268
-rw-r--r--  1  781649 Sep  5 18:11 N24L2_No0004.cor
-rw-r--r--  1    1110 Sep  5 16:43 N24L2_No0004.ctrl
-rw-r--r--  1 390929 Sep  5 16:43 N24L2_No0005.cor
-rw-r--r--  1    1124 Sep  5 16:43 N24L2_No0005.ctrl
-rw-r--r--  1   51051 Sep  5 16:43 N24L2_No0005.log
drwxr-xr-x  2    4096 Sep  5 16:46 delays
-rw-r--r--  1   46394 Sep  5 16:43 n24l2.vix
```

Creating a MeasurementSet

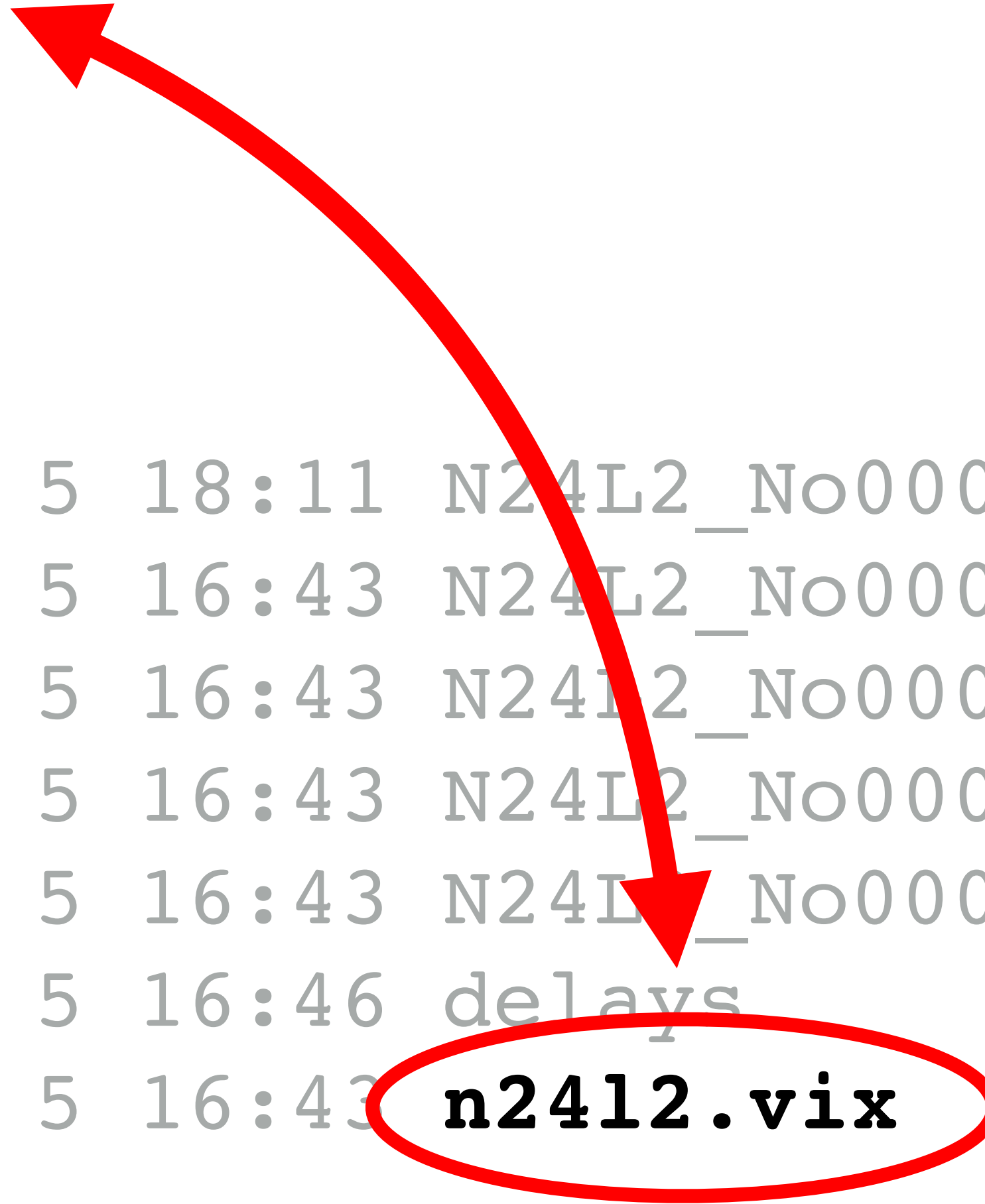
```
$> pwd
```

```
/home/workshop23/n2412/
```

```
$> ls -l
```

```
total 1268
```

```
-rw-r--r-- 1 781649 Sep 5 18:11 N24L2_No0004.cor  
-rw-r--r-- 1 1110 Sep 5 16:43 N24L2_No0004.ctrl  
-rw-r--r-- 1 390929 Sep 5 16:43 N2412_No0005.cor  
-rw-r--r-- 1 1124 Sep 5 16:43 N24L2_No0005.ctrl  
-rw-r--r-- 1 51051 Sep 5 16:43 N24L2_No0005.log  
drwxr-xr-x 2 4096 Sep 5 16:46 delays  
-rw-r--r-- 1 46394 Sep 5 16:43 n2412.vix
```



Creating a MeasurementSet

```
$> j2ms2 -o n2412.ms *.cor
```

<https://code.jive.eu/verkout/jive-casa/src/branch/master/j2ms2.md>

Creating a MeasurementSet

```
$> j2ms2 -o n24l2.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n24l2/n24l2.vix
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Da, will write 0.0
```

```
<<< snip >>
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Cm, will write 0.0
```

```
***** Experiment N24L2 *****
```

```
Output is placed in: n24l2.ms
```

```
Data is written in the MS in the frequency domain
```

```
==> Data formats exhausted. We tried the following:
```

```
(trying SFXC-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/SFXCVisBuffer.cc:364
```

```
in method: void SFXCVisBuffer::createSubbandMapping()
```

```
frequency_nr 0/LSB not found in FrequencyConfig sess224.L1024
```

```
(trying UniBoard-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/UNBVisBuffer.cc:674
```

```
in method: UNBVisBuffer::UNBVisBuffer(const casacore::String&, const Experiment*, const std::string&)
```

```
Cannot access '/home/workshop23/n24l2/N24L2_No0004.cor.json'
```

```
Something went wrong opening 'N24L2_No0004.cor'. Please check any error messages above.
```

```
$>
```

Creating a MeasurementSet

```
$> j2ms2 -o n24l2.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n24l2/n24l2.vix
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Da, will write 0.0
```

```
<<< snip >>
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Cm, will write 0.0
```

```
***** Experiment N24L2 *****
```

```
Output is placed in: n24l2.ms
```

```
Data is written in the MS in the frequency domain
```

```
==> Data formats exhausted. We tried the following:
```

```
(trying SFXC-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/SFXCVisBuffer.cc:364
```

```
in method: void SFXCVisBuffer::createSubbandMapping()
```

```
frequency_nr 0/LSB not found in FrequencyConfig sess224.L1024
```

```
(trying UniBoard-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/UNBVisBuffer.cc:674
```

```
in method: UNBVisBuffer::UNBVisBuffer(const casacore::String&, const Experiment*, const std::string&)
```

```
Cannot access '/home/workshop23/n24l2/N24L2_No0004.cor.json'
```

```
Something went wrong opening 'N24L2_No0004.cor'. Please check any error messages above.
```

```
$>
```

Creating a MeasurementSet

```
$> j2ms2 -o n24l2.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n24l2/n24l2.vix
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Da, will write 0.0
```

```
<<< snip >>
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Cm, will write 0.0
```

```
***** Experiment N24L2 *****
```

```
Output is placed in: n24l2.ms
```

```
Data is written in the MS in the frequency domain
```

```
=> Data formats exhausted. We tried the following:
```

```
(trying SFXC-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/SFXCVisBuffer.cc:364
```

```
in method: void SFXCVisBuffer::createSubbandMapping()
```

```
frequency_nr 0/LSB not found in FrequencyConfig sess224.L1024
```

```
(trying UniBoard-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/UNBVisBuffer.cc:674
```

```
in method: UNBVisBuffer::UNBVisBuffer(const casacore::String&, const Experiment*, const std::string&)
```

```
Cannot access '/home/workshop23/n24l2/N24L2_No0004.cor.json'
```

```
Something went wrong opening 'N24L2_No0004.cor'. Please check any error messages above.
```

```
$>
```


Creating a MeasurementSet

```
$> j2ms2 -o n24l2.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n24l2/n24l2.vix
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Da, will write 0.0
```

```
<<< snip >>
```

```
/home/workshop23/n24l2/n24l2.vix: Missing or erroneous antenna diameter for Da, will write 0.0
```

```
***** Experiment N24L2 *****
```

```
Output is placed in: n24l2.ms
```

```
Data is written in the MS in the frequency domain
```

```
==> Data formats exhausted. We tried the following:
```

```
(trying SFXC-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/SFXCVisBuffer.cc:364
```

```
in method: void SFXCVisBuffer::createSubbandMapping()
```

```
frequency_nr 0/LSB not found in FrequencyConfig sess224.L1024
```

```
(trying UniBoard-format): jexcept:
```

```
/usr/local/src/jive-casa/jive/j2ms/UNBVisBuffer.cc:674
```

```
in method: UNBVisBuffer::UNBVisBuffer(const casacore::String&, const Experiment*, const std::string&)
```

```
Cannot access '/home/workshop23/n24l2/N24L2_No0004.cor.json'
```

```
Something went wrong opening 'N24L2_No0004.cor'. Please check any error messages above.
```

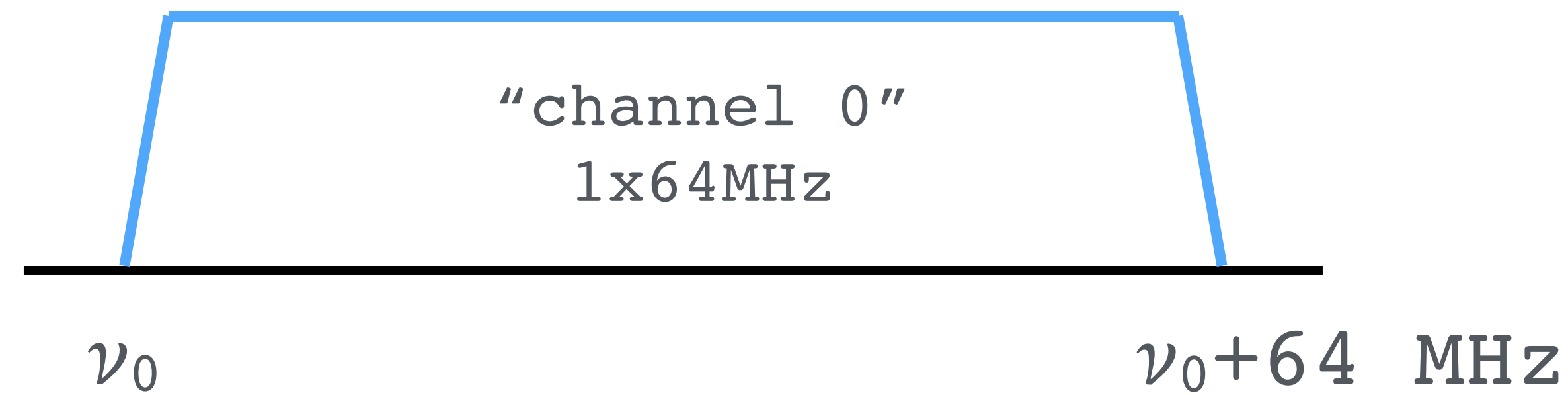
```
$>
```



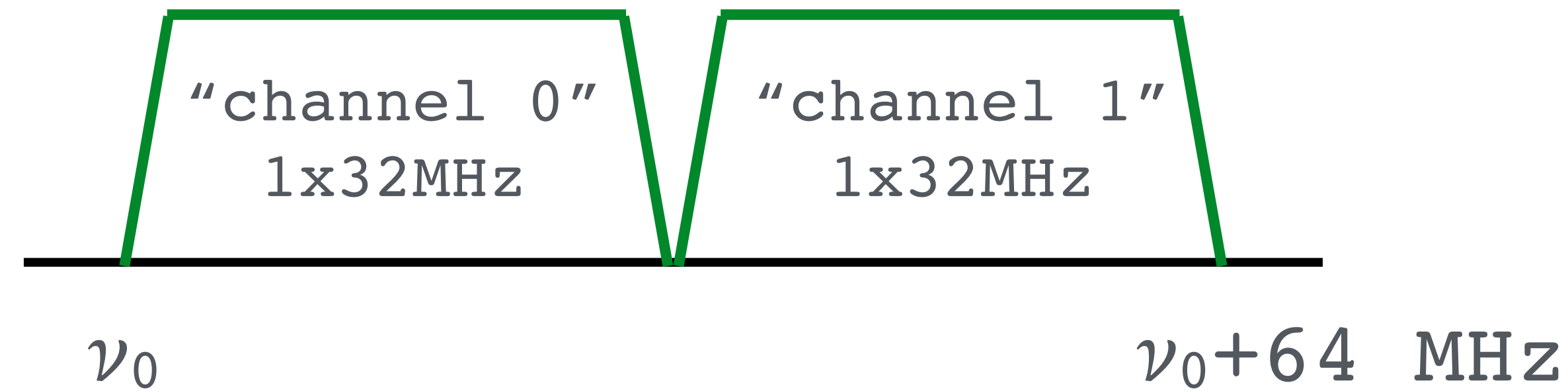
Mixed-bandwidth
correlation

Mixed bandwidth (as observed)

Station X



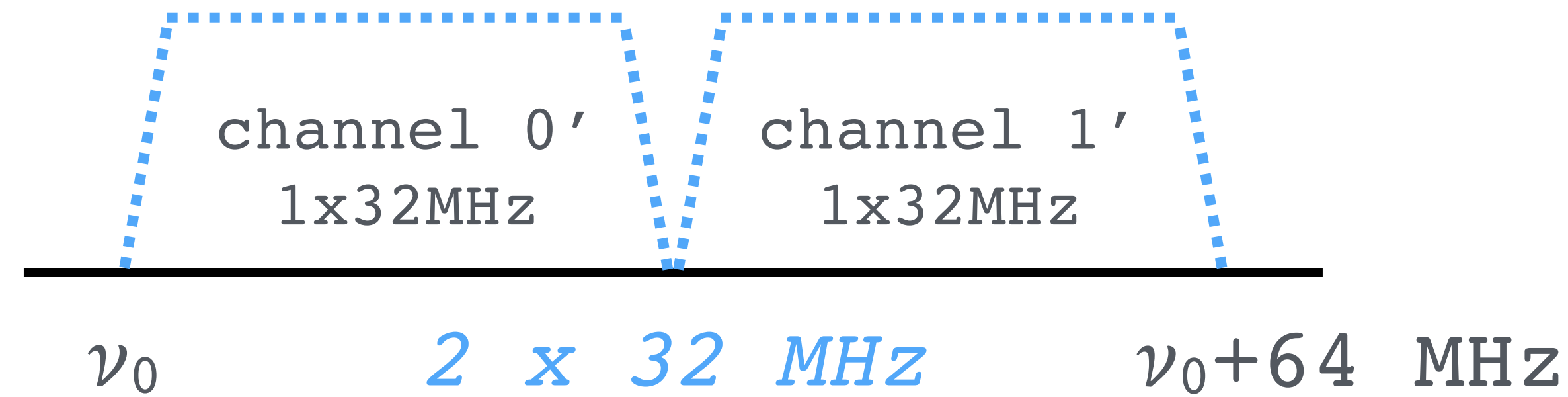
Station Y



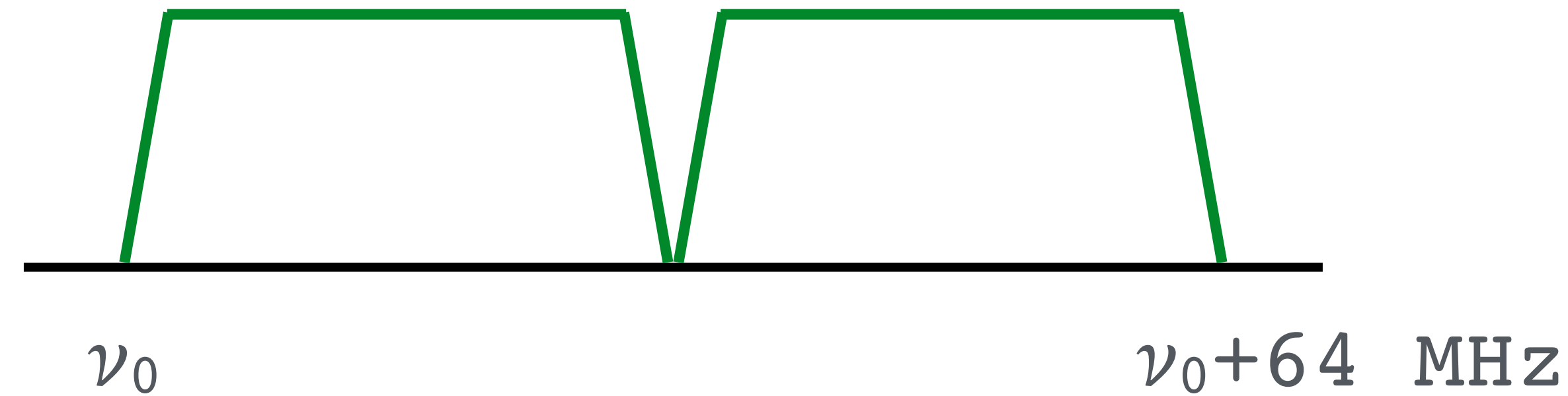
This is how it's recorded in the VEX file!

Mixed bandwidth (as correlated)

Station X

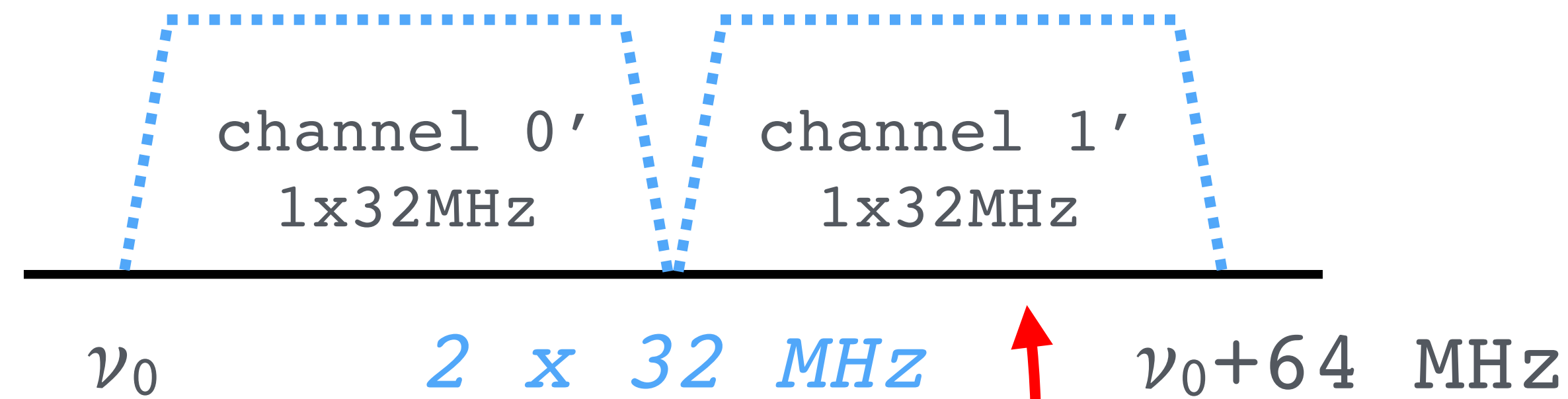


Station Y

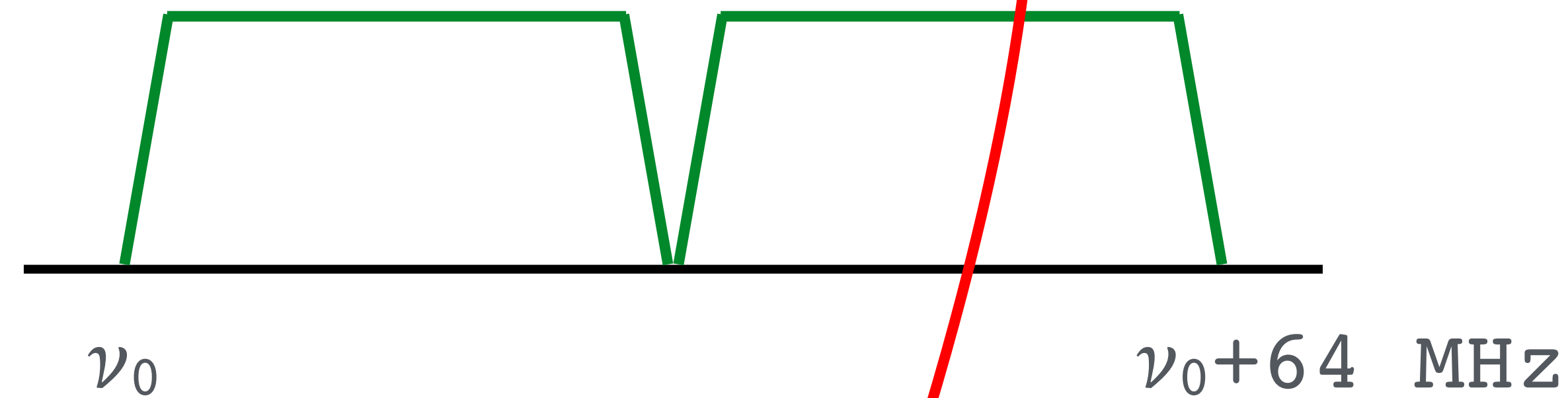


Mixed bandwidth (as correlated)

Station X



Station Y



Station X's data gets labelled with Station Y's setup

Creating a MeasurementSet

```
$> j2ms2 eo:setup_ref_station=Y -o n2412.ms *.cor
```

Creating a MeasurementSet

```
$> j2ms2 eo:setup_ref_station=Y -o n2412.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n2412/n2412.vix
```

```
<<< snip >>>
```

```
==> Find: Scan No0004 (#4): J0442-0017/sess224.L1024 ** 23-May-2024/12:32:00
```

```
Corr: Nf 32/Ti 2s/P [RR,RL,LR,LL,]/ABsw v. 12345.67890/BOCF **/dT 0
```

```
**** WARNING: SYSTEM IS IN BYPASS MODE!
```

```
DATA WILL BE IN RAW FORMAT; NO CORRECTIONS APPLIED!
```

```
<<< snip >>>
```

```
Translated @ 3.72587 Mbytes/s
```

```
-----===== Summary =====
```

```
ToMS:                600
```

```
Filt:                0
```

```
NoSCN:              0
```

```
OOSubjobRNG:        0
```

```
$>
```

Creating a MeasurementSet

```
$> j2ms2 eo:setup_ref_station=Y -o n2412.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n2412/n2412.vix
```

```
<<< snip >>>
```

```
==> Find: Scan No0004 (#4): J0442-0017/sess224.L1024 ** 23-May-2024/12:32:00
```

```
Corr: Nf 32/Ti 2s/P [RR,RL,LR,LL,]/ABsw v. 12345.67890/BOCF **/dT 0
```

```
**** WARNING: SYSTEM IS IN BYPASS MODE!
```

```
DATA WILL BE IN RAW FORMAT; NO CORRECTIONS APPLIED!
```

```
<<< snip >>>
```

```
Translated @ 3.72587 Mbytes/s
```

```
-----===== Summary =====
```

```
ToMS:                600
```

```
Filt:                0
```

```
NoSCN:               0
```

```
OOSubjobRNG:         0
```

```
$>
```


Creating a MeasurementSet

```
$> j2ms2 eo:setup_ref_station=Y -o n2412.ms *.cor
```

```
j2ms2: Version 1.0.6 git:master@10b9150* begins
```

```
VEXperiment - Using VEXfile=/home/workshop23/n2412/n2412.vix
```

```
<<< snip >>>
```

```
==> Find: Scan No0004 (#4): J0442-0017/sess224.L1024 ** 23-May-2024/12:32:00
```

```
Corr: Nf 32/Ti 2s/P [RR,RL,LR,LL,]/ABsw v. 12345.67890/BOCF **/dT 0
```

```
**** WARNING: SYSTEM IS IN BYPASS MODE!
```

```
DATA WILL BE IN RAW FORMAT; NO CORRECTIONS APPLIED!
```

```
<<< snip >>>
```

```
Translated @ 3.72587 Mbytes/s
```

```
-----===== Summary =====
```

```
ToMS: 600
```

```
Filt: 0
```

```
NoSCN: 0
```

```
OOSubjobRNG: 0
```

```
$>
```


Creating a MeasurementSet

```
$> ls -l
total 1268
-rw-r--r--  1 781649 Sep  5 18:11 N24L2_No0004.cor
-rw-r--r--  1  1110 Sep  5 16:43 N24L2_No0004.ctrl
-rw-r--r--  1 390929 Sep  5 16:43 N24L2_No0005.cor
-rw-r--r--  1  1124 Sep  5 16:43 N24L2_No0005.ctrl
-rw-r--r--  1  51051 Sep  5 16:43 N24L2_No0005.log
drwxr-xr-x  2  4096 Sep  5 16:46 delays
-rw-r--r--  1  46394 Sep  5 16:43 n24l2.vix
drwxr-xr-x 16  4096 Sep 19 14:19 n24l2.ms
```

Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

```
tConvert: Version 1.0.6 git:master@10b9150* BEGINS!
```

```
ms2idi: Please wait whilst opening + sorting n2412/n2412.ms by TIME, BL, SOURCE ...
```

```
ms2idi: Start to analyze the MeasurementSet if it can be represented in FITS format ...
```

```
-> relabeling MS frequency-group 0 to AIPS FQ #1
```

```
-> MS appears to contain interferometric data. Using complex 'DATA' column
```

```
-> Deduced, for the first IF (out of 4) in the first FQ_GROUP:
```

```
  n_ch x n_pol          : 32 x 4
```

```
  ref. freq, bw, ch inc: 1.59499 GHz, 32 MHz, 1000 kHz
```

```
ms2idi: Start generating HDUs
```

```
  FREQUENCY: relabeled detected LSBs SPW:0 SPW:2 as USB in the FITS file!
```

```
  SOURCE: No EPOCH for field#          : 0 1 (defaulted to J2000)
```

```
  SOURCE: No source specific info for: 0 1
```

```
  ANTENNA: each entry in the MS ANTENNA will be marked valid for the whole experiment
```

```
ms2idi: no HDUs generated by generators: idiFlag idiGainCurve idiSysTemp
```

```
  UV_TABLE: Couldn't find MS epoch. Assuming J2000.
```

```
  UV_TABLE: UVW_PHASE_CONVENTION[CASA] processing: data=CONJ(data)
```

```
  UV_TABLE: File 1 - Done: 0.1%
```


Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

```
tConvert: Version 1.0.6 git:master@10b9150* BEGINS!
```

```
ms2idi: Please wait whilst opening + sorting n2412/n2412.ms by TIME, BL, SOURCE ...
```

```
ms2idi: Start to analyze the MeasurementSet if it can be represented in FITS format ...
```

```
-> relabeling MS frequency-group 0 to AIPS FQ #1
```

```
-> MS appears to contain interferometric data. Using complex 'DATA' column
```

```
-> Deduced, for the first IF (out of 4) in the first FQ_GROUP:
```

```
  n_ch x n_pol          : 32 x 4
```

```
  ref. freq, bw, ch inc: 1.59499 GHz, 32 MHz, 1000 kHz
```

```
ms2idi: Start generating HDUs
```

```
FREQUENCY: relabeled detected LSBs SPW:0 SPW:2 as USB in the FITS file!
```

```
SOURCE: No EPOCH for field#          : 0 1 (defaulted to J2000)
```

```
SOURCE: No source specific info for: 0 1
```

```
ANTENNA: each entry in the MS ANTENNA will be marked valid for the whole experiment
```

```
ms2idi: no HDUs generated by generators: idiFlag idiGainCurve idiSysTemp
```

```
UV_TABLE: Couldn't find MS epoch. Assuming J2000.
```

```
UV_TABLE: UVW_PHASE_CONVENTION[CASA] processing: data=CONJ(data)
```

```
UV_TABLE: File 1 - Done: 0.1%
```

Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

```
tConvert: Version 1.0.6 git:master@10b9150* BEGINS!
```

```
ms2idi: Please wait whilst opening + sorting n2412/n2412.ms by TIME, BL, SOURCE ...
```

```
ms2idi: Start to analyze the MeasurementSet if it can be represented in FITS format ...
```

```
-> relabeling MS frequency-group 0 to AIPS FQ #1
```

```
-> MS appears to contain interferometric data. Using complex 'DATA' column
```

```
-> Deduced, for the first IF (out of 4) in the first FQ_GROUP:
```

```
  n_ch x n_pol          : 32 x 4
```

```
  ref. freq, bw, ch inc: 1.59499 GHz, 32 MHz, 1000 kHz
```

```
ms2idi: Start generating HDUs
```

```
  FREQUENCY: relabeled detected LSBs SPW:0 SPW:2 as USB in the FITS file!
```

```
  SOURCE: No EPOCH for field#          : 0 1 (defaulted to J2000)
```

```
  SOURCE: No source specific info for: 0 1
```

```
  ANTENNA: each entry in the MS ANTENNA will be marked valid for the whole experiment
```

```
ms2idi: no HDUs generated by generators: idiFlag idiGainCurve idiSysTemp
```

```
  UV_TABLE: Couldn't find MS epoch. Assuming J2000.
```

```
  UV_TABLE: UVW_PHASE_CONVENTION[CASA] processing: data=CONJ(data)
```

```
  UV_TABLE: File 1 - Done: 0.1%
```


Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

```
tConvert: Version 1.0.6 git:master@10b9150* BEGINS!
```

```
ms2idi: Please wait whilst opening + sorting n2412/n2412.ms by TIME, BL, SOURCE ...
```

```
ms2idi: Start to analyze the MeasurementSet if it can be represented in FITS format ...
```

```
-> relabeling MS frequency-group 0 to AIPS FQ #1
```

```
-> MS appears to contain interferometric data. Using complex 'DATA' column
```

```
-> Deduced, for the first IF (out of 4) in the first FQ_GROUP:
```

```
  n_ch x n_pol          : 32 x 4
```

```
  ref. freq, bw, ch inc: 1.59499 GHz, 32 MHz, 1000 kHz
```

```
ms2idi: Start generating HDUs
```

```
FREQUENCY: relabeled detected LSBs SPW:0 SPW:2 as USB in the FITS file!
```

```
SOURCE: No EPOCH for field#          : 0 1 (defaulted to J2000)
```

```
SOURCE: No source specific info for: 0 1
```

```
ANTENNA: each entry in the MS ANTENNA will be marked valid for the whole experiment
```

```
ms2idi: no HDUs generated by generators: idiFlag idiGainCurve idiSysTemp
```

```
UV_TABLE: Couldn't find MS epoch. Assuming J2000.
```

```
UV_TABLE: UVW_PHASE_CONVENTION[CASA] processing: data=CONJ(data)
```

```
UV_TABLE: File 1 - Done: 0.1%
```

Export to FITS-IDI

```
$> tConvert <input.ms> <OUTPUT.IDI>
```

```
tConvert: Version 1.0.6 git:master@10b9150* BEGINS!
```

```
ms2idi: Please wait whilst opening + sorting n2412/n2412.ms by TIME, BL, SOURCE ...
```

```
ms2idi: Start to analyze the MeasurementSet if it can be represented in FITS format ...
```

```
-> relabeling MS frequency-group 0 to AIPS FQ #1
```

```
-> MS appears to contain interferometric data. Using complex 'DATA' column
```

```
-> Deduced, for the first IF (out of 4) in the first FQ_GROUP:
```

```
  n_ch x n_pol          : 32 x 4
```

```
  ref. freq, bw, ch inc: 1.59499 GHz, 32 MHz, 1000 kHz
```

```
ms2idi: Start generating HDUs
```

```
  FREQUENCY: relabeled detected LSBs SPW:0 SPW:2 as USB in the FITS file!
```

```
  SOURCE: No EPOCH for field#          : 0 1 (defaulted to J2000)
```

```
  SOURCE: No source specific info for: 0 1
```

```
  ANTENNA: each entry in the MS ANTENNA will be marked valid for the whole experiment
```

```
ms2idi: no HDUs generated by generators: idiFlag idiGainCurve idiSysTemp
```

```
  UV_TABLE: Couldn't find MS epoch. Assuming J2000.
```

```
  UV_TABLE: UVW_PHASE_CONVENTION[CASA] processing: data=CONJ(data)
```

```
UV_TABLE: File 1 - Done: 0.1%
```


Export to FITS-ID1

```
$> ls -al *.ID1
```

```
-rw-r--r-- 1 2848320 Sep 19 18:02 N24L2.ID1
```

Now ... create your own Measurement Set

`https://jradcliffe5.github.io/sfxc\_workshop\_2025/`

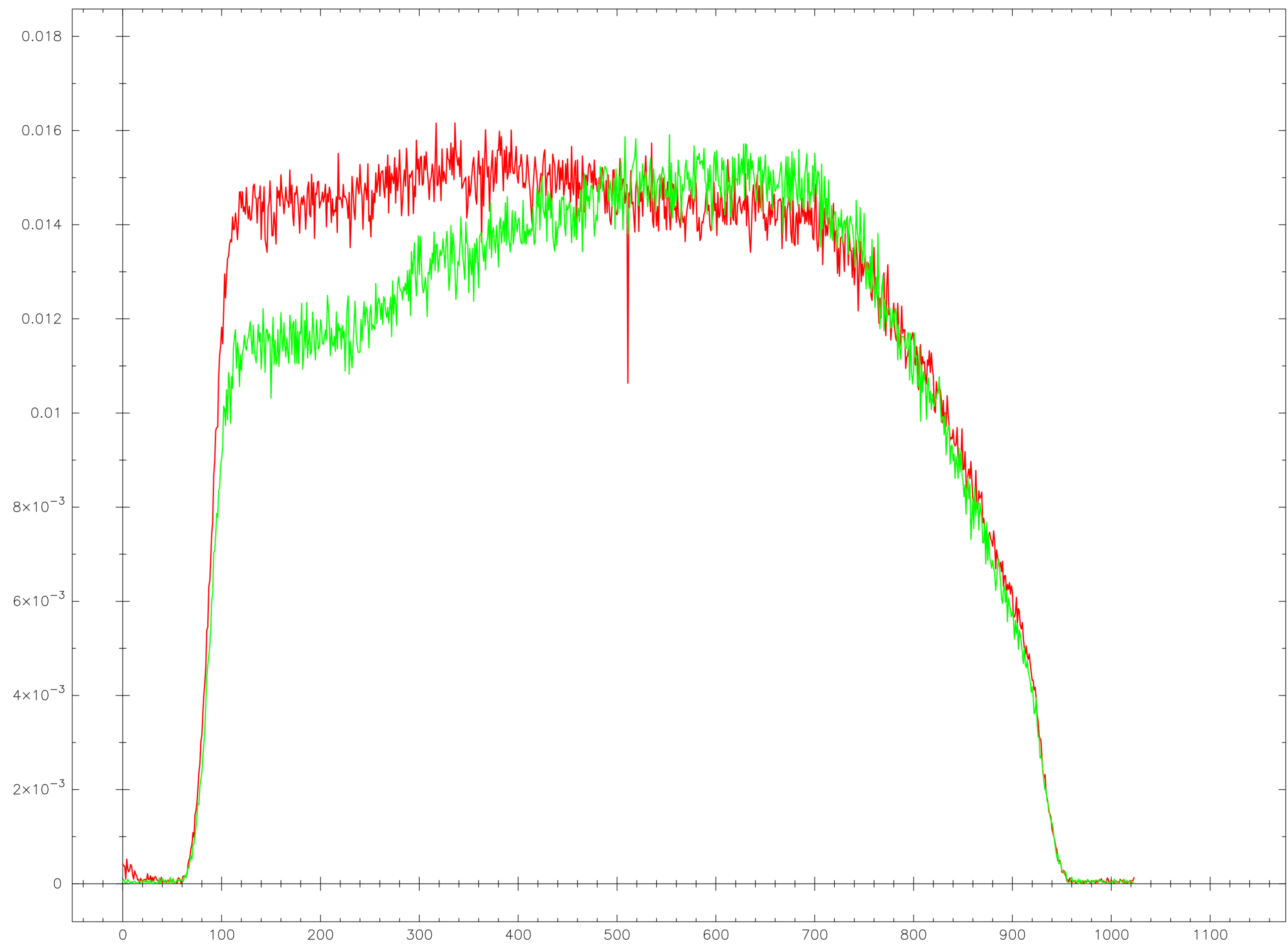


`"Post-correlation processing"`
`(correlation_post.html)`



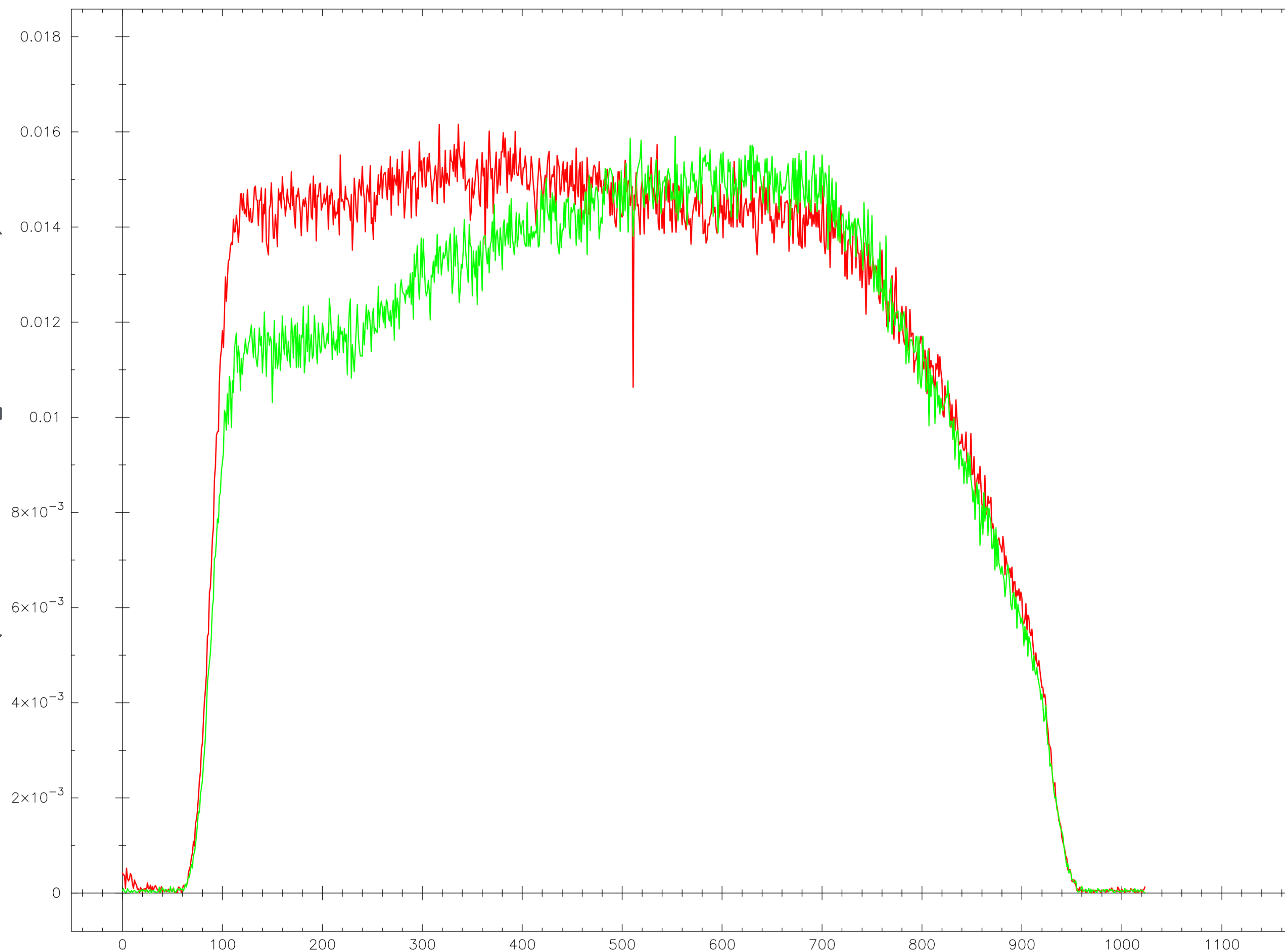
`"Translate into MeasurementSet"`
`(correlation_post.html#translate-to-measurementset)`

Visualising
what is in a
Measurement Set



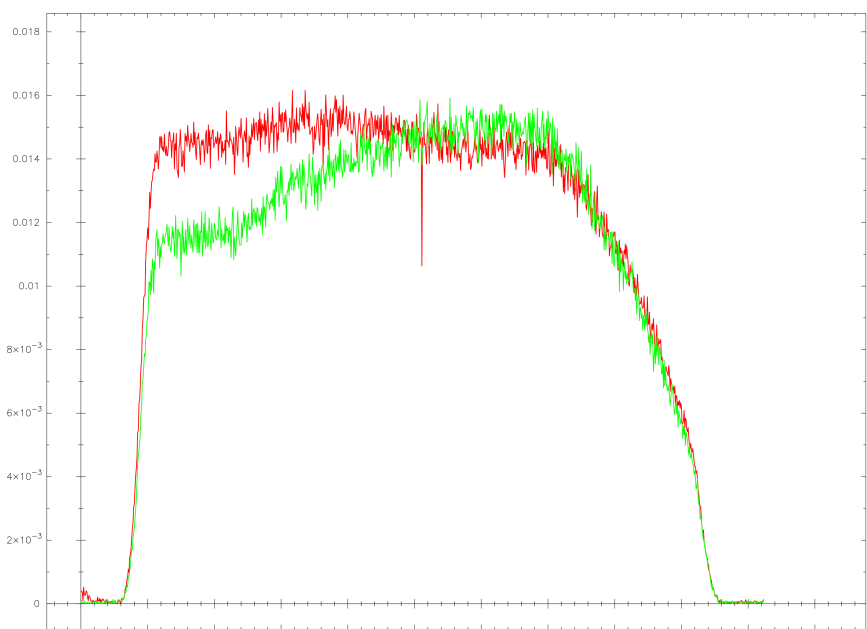
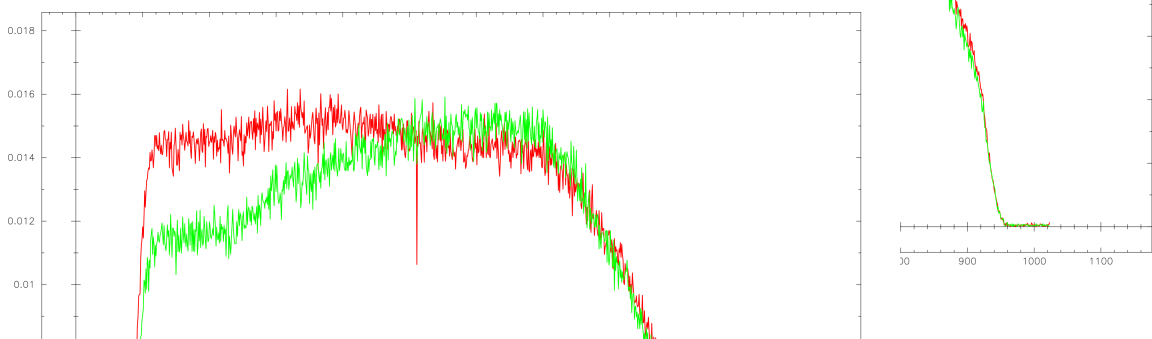
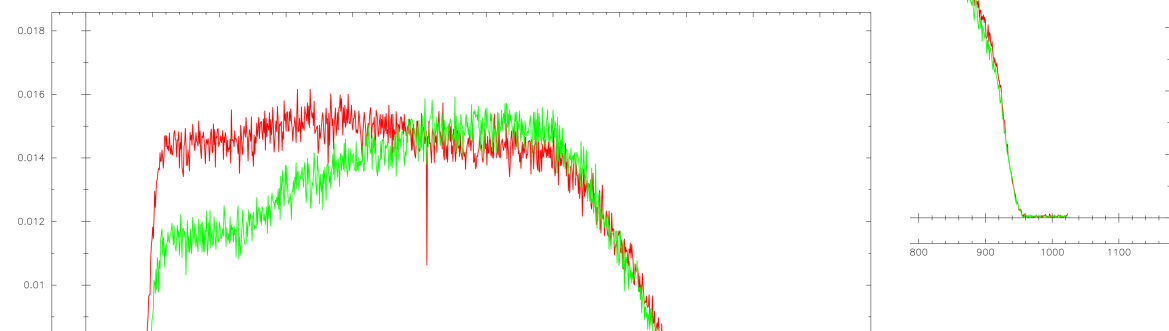
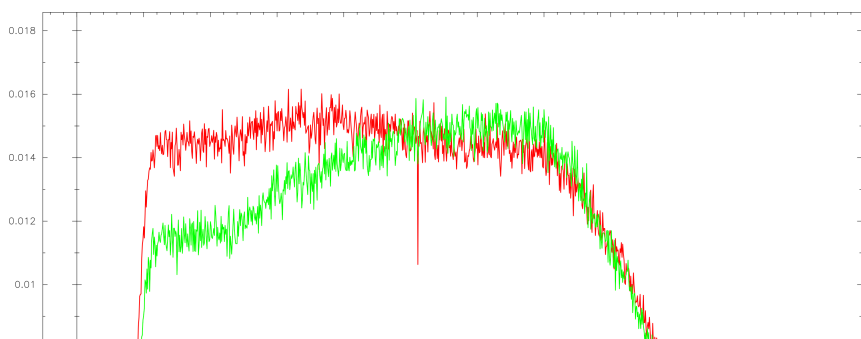
→ amplitude

(arbitrary units)



→ ν (MHz)

a.k.a. "channels"

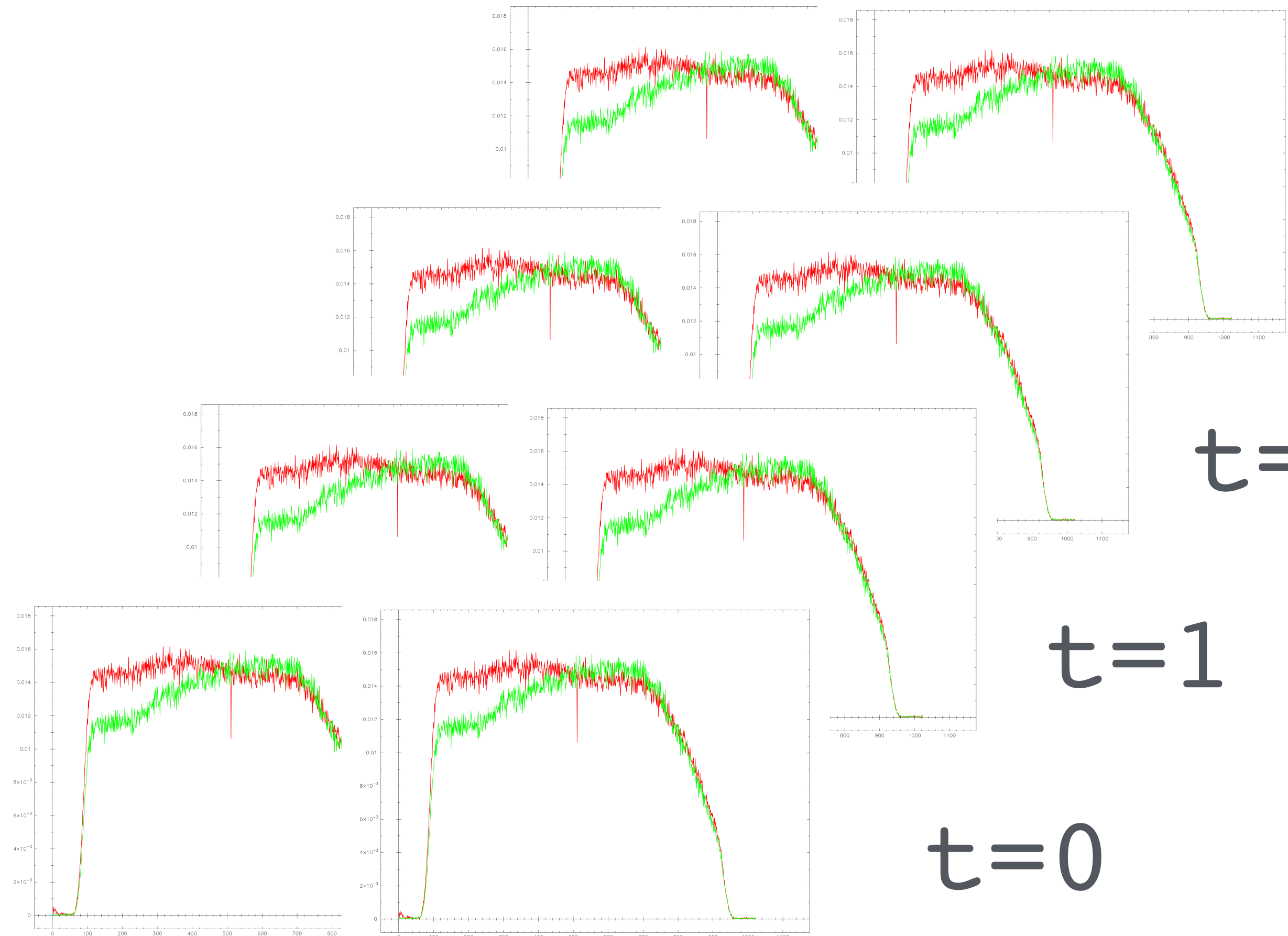


t=3

t=2

t=1

t=0



t=3

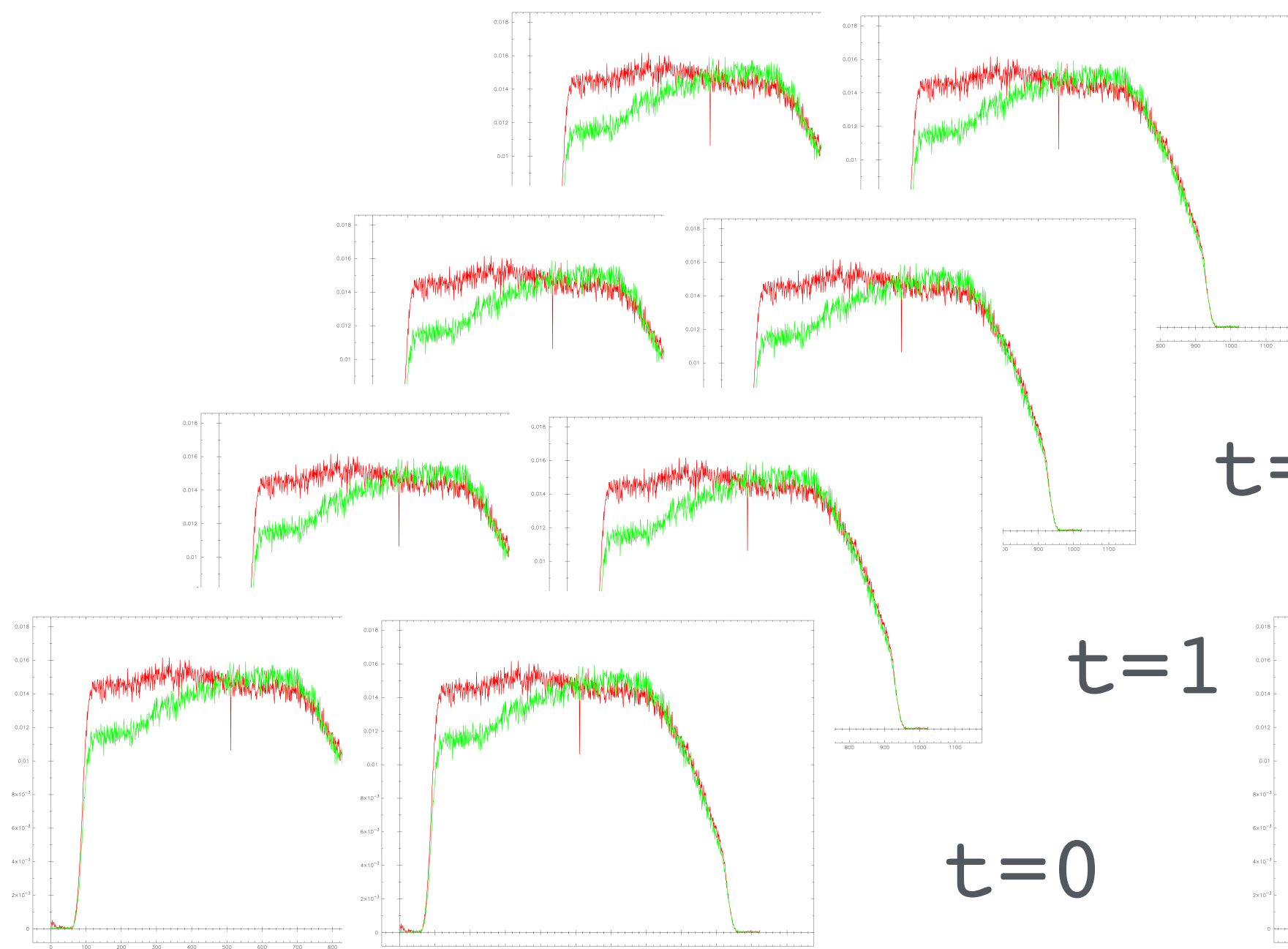
t=2

t=1

t=0

sb=0

sb=1



sb=0

sb=1

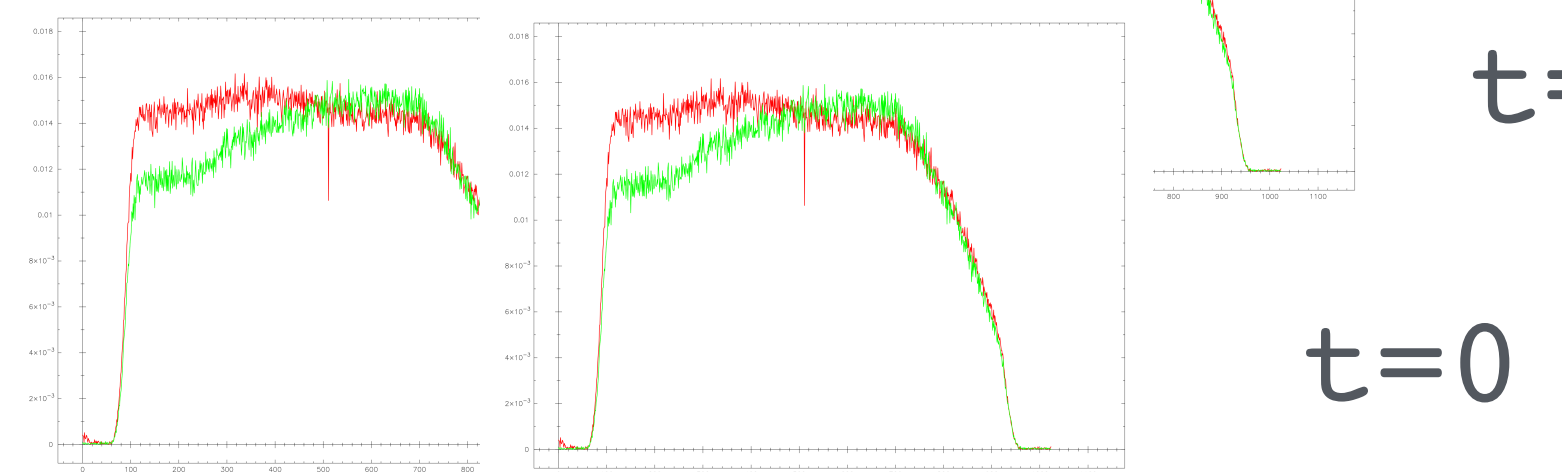
p=RR

t=3

t=2

t=1

t=0



sb=0

sb=1

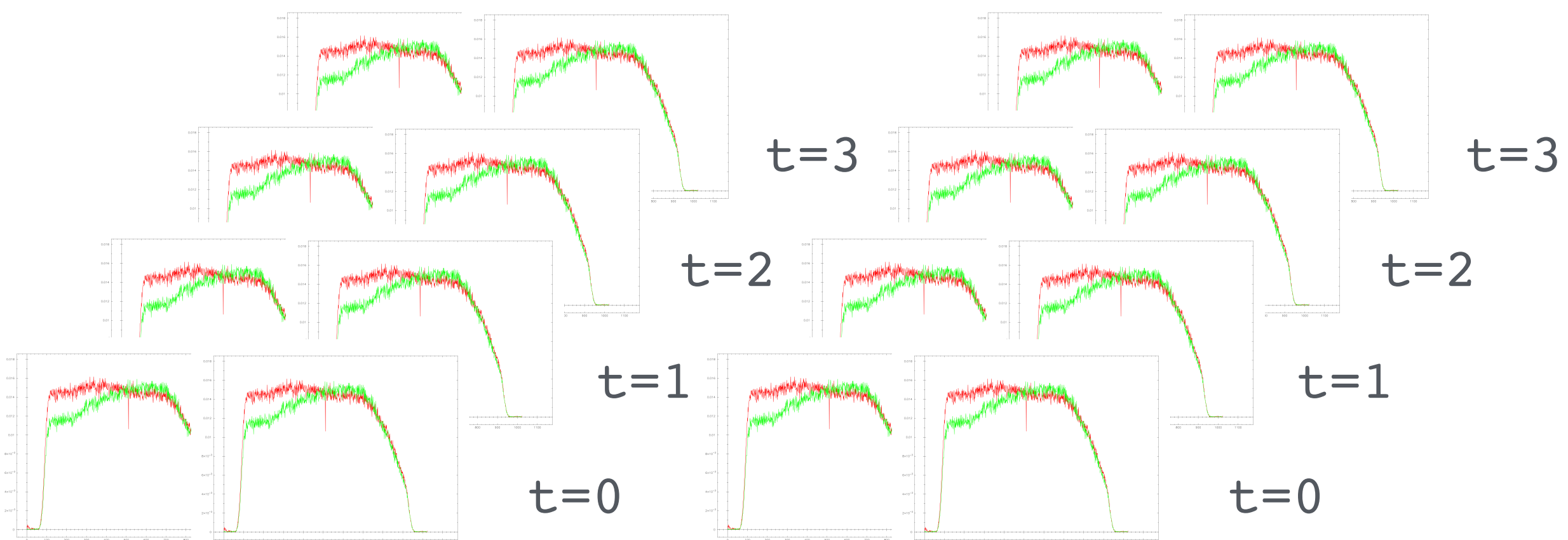
p=LL

t=3

t=2

t=1

t=0



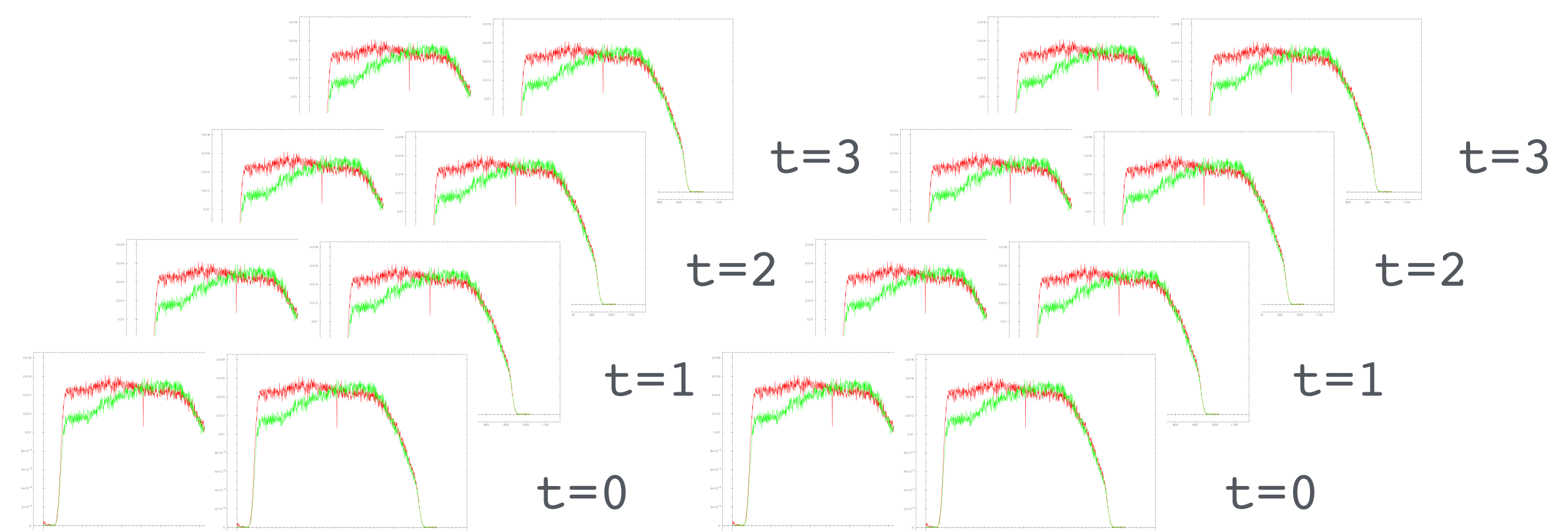
sb=0 sb=1

p=RR

sb=0 sb=1

p=LL

bl=EfWb



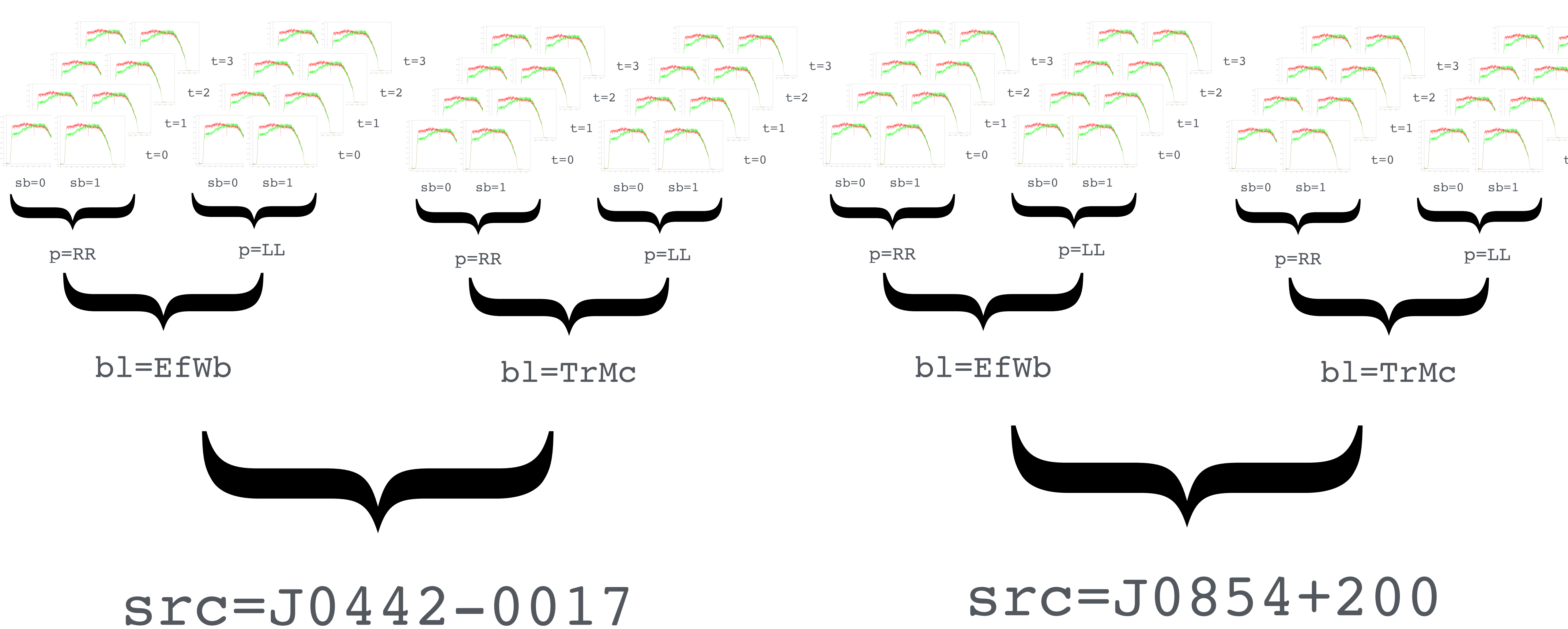
sb=0 sb=1

p=RR

sb=0 sb=1

p=LL

bl=TrMc

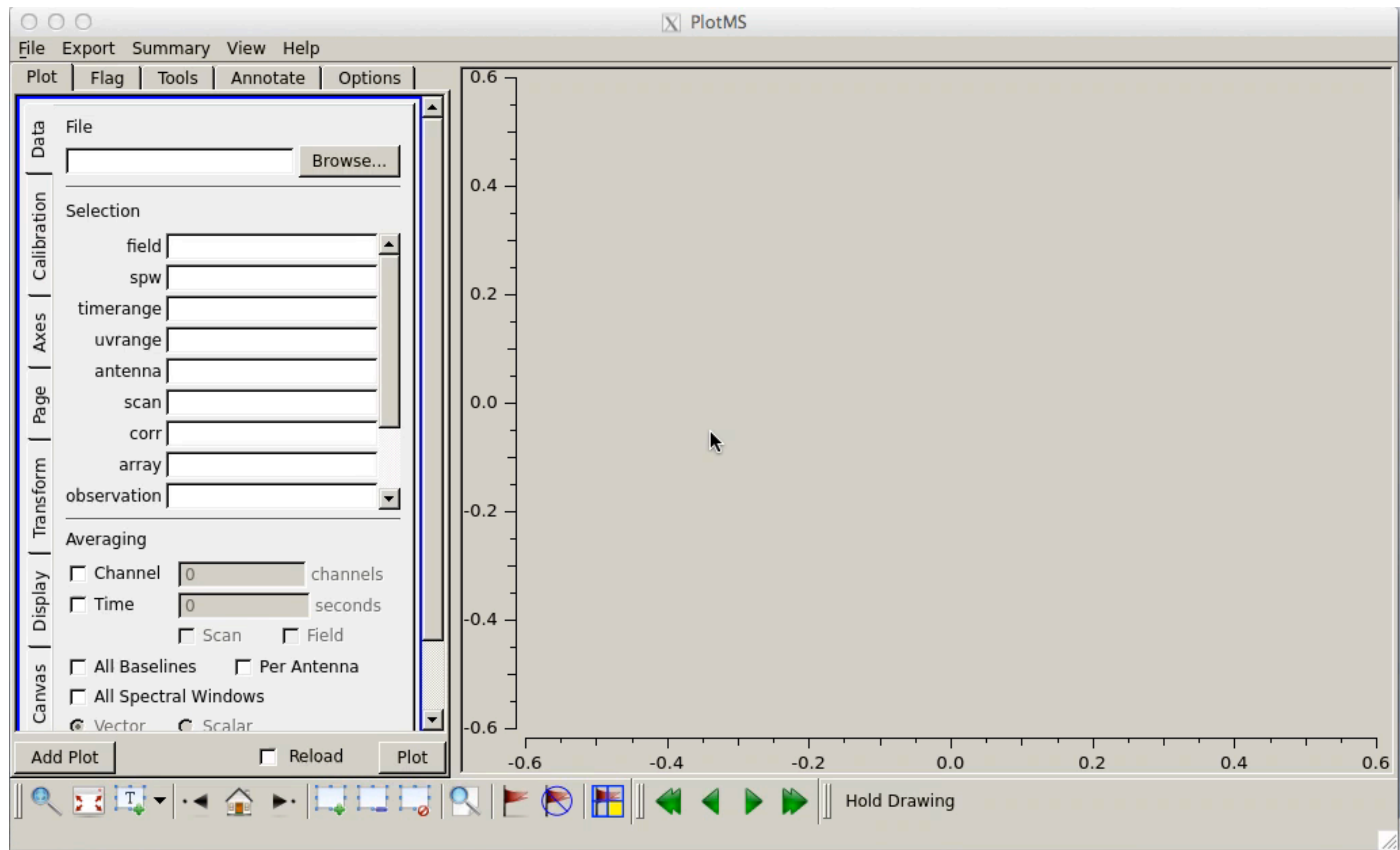


0.63+0.53j	0.74+0.65j	0.79+0.10j	0.26+0.95j	0.11+0.40j	0.27+0.82j	0.02+0.88j	0.62+0.86j	0.90+0.63j	0.39+0.55j	0.33+0.33j	0.54+0.42j	0.12+0.10j	0.72+0.45j	0.04+0.27j
0.06+0.42j	0.94+0.44j	0.88+0.73j	0.31+0.21j	0.36+0.74j	0.62+0.68j	0.83+0.08j	0.51+0.01j	0.92+0.50j	0.78+0.29j	0.71+0.97j	0.78+0.01j	0.57+0.45j	0.53+0.59j	0.24+0.69j
0.22+0.03j	0.56+0.35j	0.09+0.36j	0.26+0.92j	0.99+0.79j	0.43+0.64j	0.22+0.50j	0.30+0.09j	0.48+0.09j	0.54+0.79j	0.10+0.51j	0.94+0.53j	0.53+0.87j	0.43+0.87j	0.77+0.31j
0.30+0.63j	0.86+0.42j	0.79+0.25j	0.60+0.87j	0.55+0.51j	0.77+0.59j	0.65+0.64j	0.70+0.04j	0.94+0.13j	0.85+0.79j	0.70+0.50j	0.81+0.16j	0.14+0.54j	0.76+0.49j	0.48+0.74j
0.49+0.20j	0.83+0.53j	0.55+0.75j	0.66+0.33j	0.33+0.24j	0.46+0.35j	0.45+0.41j	0.03+0.85j	0.88+0.09j	0.86+0.71j	0.22+0.20j	0.76+0.39j	0.41+0.99j	0.93+0.64j	0.76+0.57j
0.01+0.26j	0.91+0.38j	0.09+0.23j	0.13+0.01j	1.00+0.65j	0.75+0.20j	0.10+0.27j	0.32+0.49j	0.87+0.28j	0.93+0.42j	0.65+0.58j	0.38+0.66j	0.18+0.92j	0.34+0.88j	0.62+0.10j
0.21+0.29j	0.16+0.41j	0.19+0.82j	0.35+0.74j	0.52+0.84j	0.63+0.99j	0.38+0.73j	0.13+0.21j	0.17+0.54j	0.84+0.62j	0.71+0.02j	0.16+0.40j	0.57+0.14j	0.46+0.48j	0.49+0.92j
0.97+0.04j	0.98+0.18j	0.31+0.12j	0.32+0.90j	0.65+0.83j	0.69+0.32j	0.44+0.15j	0.20+0.30j	0.66+0.13j	0.88+0.14j	0.88+0.08j	0.81+0.76j	0.76+0.99j	0.23+0.26j	0.40+0.87j
0.23+0.64j	0.66+0.81j	0.45+0.91j	0.85+0.07j	0.52+0.57j	0.86+0.11j	0.96+0.14j	0.47+0.85j	0.64+0.36j	0.15+0.57j	0.46+0.59j	0.71+0.91j	0.71+0.20j	0.77+0.93j	0.09+0.60j
0.70+0.65j	0.38+0.40j	0.35+0.98j	0.48+0.90j	0.30+0.76j	0.88+0.20j	0.46+0.34j	0.62+0.95j	0.55+0.34j	0.20+0.92j	0.55+0.76j	0.63+0.79j	0.63+0.48j	0.89+0.99j	0.28+0.87j
0.56+0.46j	0.08+0.35j	0.85+0.65j	0.61+0.24j	0.89+0.10j	0.34+0.16j	0.48+0.78j	0.49+0.94j	0.85+0.28j	0.23+0.31j	0.27+0.90j	0.22+0.84j	0.98+0.93j	0.67+0.19j	0.62+0.38j
0.00+0.40j	0.12+1.00j	0.63+0.51j	0.11+0.34j	0.51+0.93j	0.78+0.70j	0.60+0.32j	0.65+0.75j	0.48+0.88j	0.60+0.35j	0.86+0.02j	0.61+0.81j	0.81+0.72j	0.05+0.19j	0.54+0.10j
0.03+0.62j	0.07+0.18j	0.97+0.72j	0.54+0.28j	0.87+0.46j	0.54+0.20j	0.58+0.40j	0.29+0.44j	0.56+0.09j	0.54+0.85j	0.06+0.54j	0.02+0.26j	0.99+0.81j	0.11+0.59j	0.90+0.74j
0.24+0.32j	0.60+0.81j	0.49+0.48j	0.12+0.93j	0.33+0.72j	0.47+0.11j	0.82+0.14j	0.02+1.00j	0.86+0.75j	0.23+0.16j	0.45+0.56j	0.05+0.99j	0.18+0.64j	0.19+0.04j	0.40+0.29j
0.51+0.84j	0.87+0.11j	0.37+0.64j	0.61+0.63j	0.64+0.22j	0.21+0.29j	0.23+0.14j	0.35+0.65j	0.70+0.59j	0.19+0.08j	0.78+0.02j	0.39+0.93j	0.63+0.65j	0.18+0.57j	0.72+0.44j
0.20+0.75j	0.96+0.29j	0.87+0.68j	0.99+0.82j	0.03+0.09j	0.31+0.33j	0.43+0.58j	0.41+0.11j	0.60+0.25j	0.30+0.94j	0.88+0.88j	0.66+0.38j	0.80+0.76j	0.44+0.99j	0.59+0.84j
0.77+0.09j	0.33+0.78j	0.88+0.19j	0.35+0.55j	0.27+0.19j	0.40+0.81j	0.74+0.17j	0.11+0.76j	0.72+0.78j	0.34+0.57j	0.82+0.78j	0.20+0.06j	0.82+0.58j	0.41+0.72j	0.83+0.95j
0.36+0.65j	0.01+0.25j	0.70+0.21j	0.71+0.94j	0.76+0.60j	0.69+0.30j	0.98+0.01j	0.14+0.41j	0.26+0.59j	0.55+0.30j	0.32+0.93j	0.47+0.19j	0.91+0.64j	0.87+0.50j	0.59+0.17j
0.06+0.25j	0.03+0.66j	0.43+0.79j	0.48+0.06j	0.85+0.54j	0.98+0.69j	0.02+0.57j	0.34+0.97j	0.53+0.85j	0.43+0.23j	0.44+0.72j	0.49+0.35j	0.63+0.99j	0.85+0.30j	0.67+0.89j
0.71+0.69j	0.64+0.30j	0.04+0.59j	0.04+0.14j	0.98+0.62j	0.12+0.62j	0.05+0.67j	0.00+0.17j	0.24+0.22j	0.14+0.61j	0.31+0.67j	0.67+0.80j	0.29+0.63j	0.92+0.91j	0.49+0.85j
0.85+0.65j	0.89+0.38j	0.79+0.18j	0.71+0.24j	0.77+0.41j	0.15+0.34j	0.96+0.72j	0.92+0.98j	0.89+0.71j	0.40+0.53j	0.96+0.45j	0.95+0.61j	0.69+0.90j	0.45+0.33j	0.15+0.05j
0.77+0.97j	0.69+0.14j	0.31+0.90j	0.10+0.46j	0.31+0.29j	0.29+0.00j	0.43+0.42j	0.09+0.05j	0.49+0.60j	0.89+0.17j	0.31+0.82j	0.60+0.61j	0.80+0.47j	0.61+0.51j	0.83+0.69j
0.92+0.86j	0.48+0.75j	0.08+0.99j	0.88+0.46j	0.76+0.78j	0.46+0.77j	0.89+0.75j	0.80+0.08j	0.38+0.77j	0.43+0.41j	0.98+0.50j	0.20+0.36j	0.50+0.13j	0.31+0.33j	0.90+0.39j
0.80+0.41j	0.18+0.73j	0.64+0.30j	0.10+0.11j	0.92+0.20j	0.33+0.13j	0.35+0.76j	0.61+0.88j	0.75+0.30j	0.79+0.26j	0.13+0.41j	0.86+0.12j	0.04+0.87j	0.91+0.54j	0.05+0.67j
0.14+0.90j	0.18+0.42j	0.84+0.89j	0.21+0.81j	0.52+0.35j	0.24+0.83j	0.30+0.10j	0.63+0.11j	0.52+0.37j	0.95+0.27j	0.64+0.05j	0.10+0.12j	0.56+0.76j	0.30+0.49j	0.58+0.67j
0.60+0.66j	0.20+0.01j	0.81+0.42j	0.26+0.12j	0.31+0.77j	0.42+0.81j	0.11+0.94j	0.98+0.69j	0.22+0.90j	0.85+0.06j	0.49+0.47j	0.55+0.28j	0.30+0.00j	0.71+0.91j	0.18+0.38j
0.55+0.08j	0.25+0.75j	0.52+0.44j	0.40+0.21j	0.85+0.49j	0.03+0.87j	0.74+0.98j	0.10+0.83j	0.17+0.41j	0.33+0.81j	0.22+0.61j	0.30+0.17j	0.75+0.56j	0.58+0.36j	0.09+0.30j
0.39+0.71j	0.61+0.59j	0.70+0.88j	0.09+0.84j	0.20+0.76j	0.01+0.57j	0.67+0.67j	0.17+0.35j	0.57+0.95j	0.71+0.89j	0.06+0.56j	0.10+0.19j	0.77+0.99j	0.20+0.83j	0.10+0.26j
0.99+0.76j	0.07+0.62j	0.84+0.18j	0.04+0.28j	0.41+0.79j	0.01+0.24j	0.29+0.24j	0.19+0.55j	0.91+0.21j	0.23+0.60j	0.87+0.32j	0.42+0.36j	0.21+0.02j	0.66+0.69j	1.00+0.88j
0.32+0.77j	0.73+0.98j	0.34+0.01j	0.92+0.50j	0.91+0.94j	0.91+0.83j	0.59+0.56j	0.59+0.56j	0.47+0.77j	0.84+0.75j	0.24+0.56j	0.45+0.58j	0.50+0.32j	0.61+0.18j	0.44+0.46j
0.47+0.70j	0.26+0.81j	0.01+0.42j	0.33+0.50j	0.52+0.86j	0.77+0.38j	0.99+0.77j	0.33+0.50j	0.80+0.75j	0.88+0.70j	0.53+0.66j	0.10+0.58j	0.23+0.45j	0.98+0.90j	0.61+0.22j
0.02+0.42j	0.85+0.88j	0.26+0.68j	0.75+0.61j	0.42+0.11j	0.76+0.57j	0.26+0.64j	0.85+0.43j	0.30+0.38j	0.27+0.10j	0.35+0.29j	0.32+0.36j	0.47+0.89j	0.51+0.07j	0.63+0.04j
0.78+0.17j	0.82+0.03j	0.76+0.75j	0.96+0.13j	0.08+0.82j	0.34+0.57j	0.45+0.02j	0.51+0.52j	0.34+0.57j	0.96+0.58j	0.08+0.60j	0.79+0.30j	0.55+0.26j	0.48+0.18j	0.18+0.58j
0.42+0.19j	0.44+0.82j	0.79+0.46j	0.42+0.80j	0.08+0.39j	0.33+0.98j	0.08+0.72j	0.80+0.13j	0.65+0.45j	0.47+0.65j	0.70+0.41j	0.65+0.75j	0.98+0.51j	0.76+0.77j	0.61+0.52j
0.61+0.35j	0.34+0.11j	0.10+0.67j	0.11+0.55j	0.40+0.56j	0.01+0.06j	0.21+0.13j	0.03+0.10j	0.14+0.85j	0.24+0.61j	0.99+0.68j	0.94+0.25j	0.77+0.48j	0.71+0.55j	0.68+0.87j
0.06+0.51j	0.41+0.85j	0.62+0.30j	0.01+0.17j	0.40+0.83j	0.87+0.73j	0.94+0.11j	0.48+0.56j	0.51+0.32j	0.86+0.72j	0.37+0.07j	0.14+0.98j	0.56+0.78j	0.60+0.96j	0.57+0.37j
0.25+0.15j	0.81+0.01j	0.24+0.26j	0.83+0.66j	0.67+0.89j	0.76+0.60j	0.51+0.90j	0.32+0.07j	0.04+0.41j	0.68+0.15j	0.66+0.92j	0.85+0.48j	0.97+0.27j	0.06+0.36j	0.41+0.72j
0.16+0.70j	0.48+0.59j	0.72+0.50j	0.51+0.74j	0.32+0.29j	0.86+0.70j	0.02+0.91j	0.47+0.31j	0.95+0.48j	0.87+0.02j	0.14+0.76j	0.33+0.91j	0.24+0.87j	0.41+0.38j	0.10+0.74j
0.07+0.99j	0.40+0.32j	0.91+0.50j	0.35+0.08j	0.29+0.78j	0.46+0.13j	0.03+0.17j	0.06+0.50j	0.91+0.36j	0.49+0.39j	0.19+0.11j	0.78+0.71j	0.55+0.81j	0.73+0.46j	0.13+0.13j
0.82+0.67j	0.49+0.07j	0.00+0.17j	0.49+0.02j	0.93+0.70j	0.67+0.47j	0.91+0.83j	0.09+0.25j	0.71+0.54j	0.21+0.04j	0.21+0.16j	0.03+0.83j	0.48+1.00j	0.73+0.56j	0.82+0.04j
0.06+0.28j	0.34+0.09j	0.76+0.94j	0.75+0.89j	0.26+0.25j	0.84+0.08j	0.68+0.50j	0.58+0.05j	0.09+0.36j	0.64+0.33j	0.12+0.77j	0.27+0.80j	0.85+0.66j	0.84+0.34j	0.32+0.43j
0.25+0.01j	0.87+0.41j	0.06+0.47j	0.24+0.07j	0.27+0.32j	0.96+0.79j	0.21+0.74j	0.38+0.09j	0.58+0.60j	0.74+0.16j	0.34+0.36j	0.34+0.54j	0.40+0.55j	0.26+0.05j	0.87+0.50j
0.22+0.31j	0.76+0.56j	0.76+0.61j	0.59+0.98j	0.42+0.14j	0.48+0.13j	0.14+0.38j	0.14+0.16j	0.73+0.83j	0.67+0.33j	0.91+0.19j	0.30+0.32j	0.82+0.80j	0.48+0.09j	0.46+0.94j
0.97+0.10j	0.69+0.01j	0.22+0.50j	0.37+0.77j	0.00+0.43j	0.35+0.54j	0.71+0.93j	0.92+0.49j	0.08+0.34j	0.34+0.14j	0.74+0.08j	0.21+0.88j	0.11+0.24j	0.06+0.30j	0.45+0.16j
0.81+0.64j	0.87+0.81j	0.78+0.88j	0.05+0.74j	0.87+0.43j	0.04+0.27j	0.63+0.87j	0.99+0.35j	0.38+0.38j	0.48+0.04j	0.07+0.99j	0.40+0.87j	0.84+0.47j	0.06+0.99j	0.74+0.22j
0.89+0.45j	0.96+0.99j	0.41+0.91j	0.14+0.99j	0.57+0.51j	0.97+0.74j	0.57+0.70j	0.96+0.39j	0.53+0.75j	0.56+0.99j	0.58+0.97j	0.47+0.03j	0.19+0.32j	0.03+0.01j	0.84+0.69j
0.59+0.97j	0.71+0.88j	0.95+0.23j	0.53+0.02j	0.11+0.22j	0.11+0.87j	0.26+0.58j	0.67+0.69j	0.26+0.92j	0.86+0.72j	0.27+0.95j	0.21+0.10j	0.39+0.02j	0.72+0.97j	0.57+0.20j

The demo MS (2 x 10s)

contains

~240.000 complex numbers

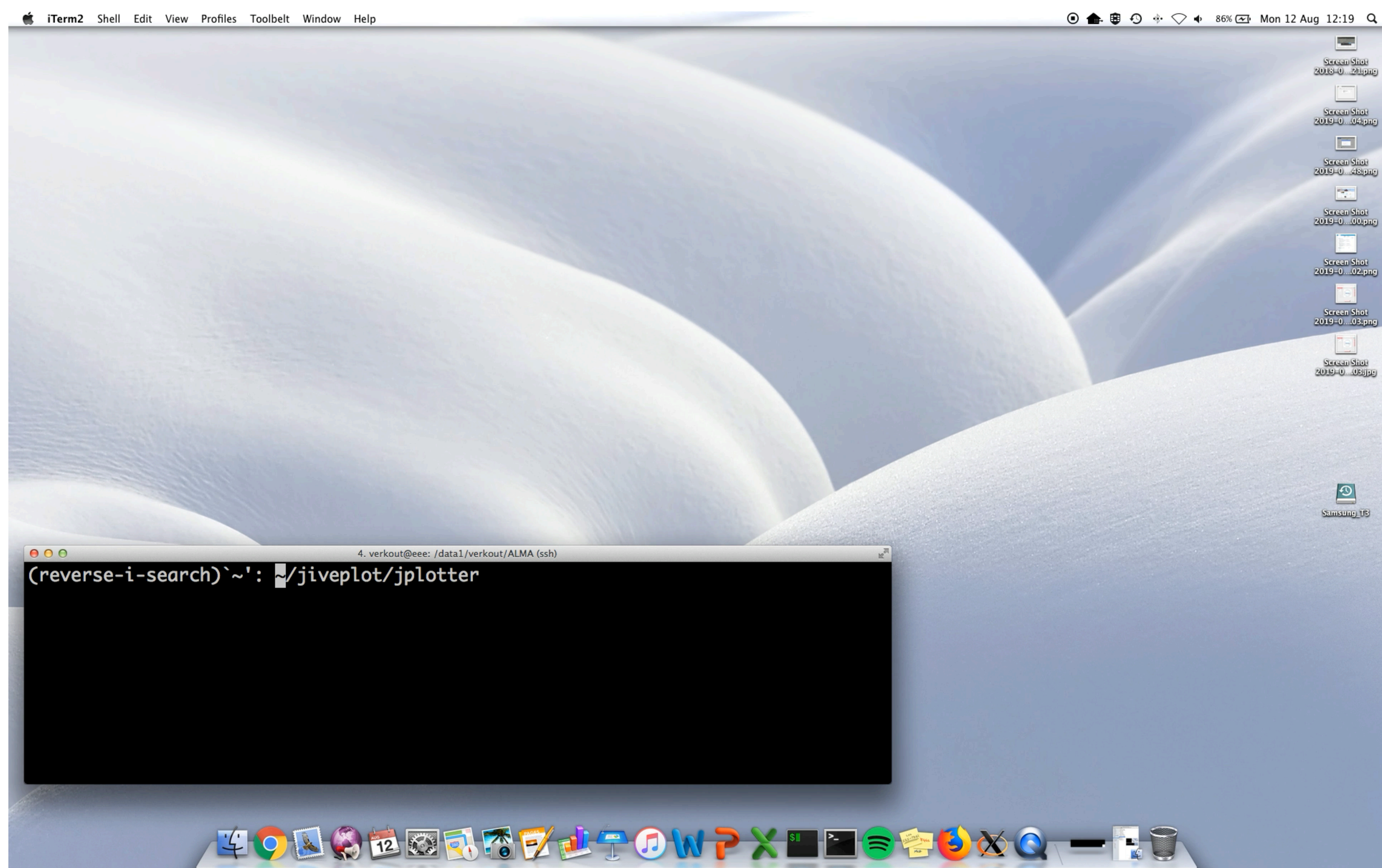


CASA "PlotMS" doing weight vs time

jplotter

Python, MeasurementSet, Plotting

https://jradcliffe5.github.io/sfxc_workshop_2025/correlation_post.html#data-inspection-using-jiveplot



jplotter doing weight vs time

EG102E

weight versus time

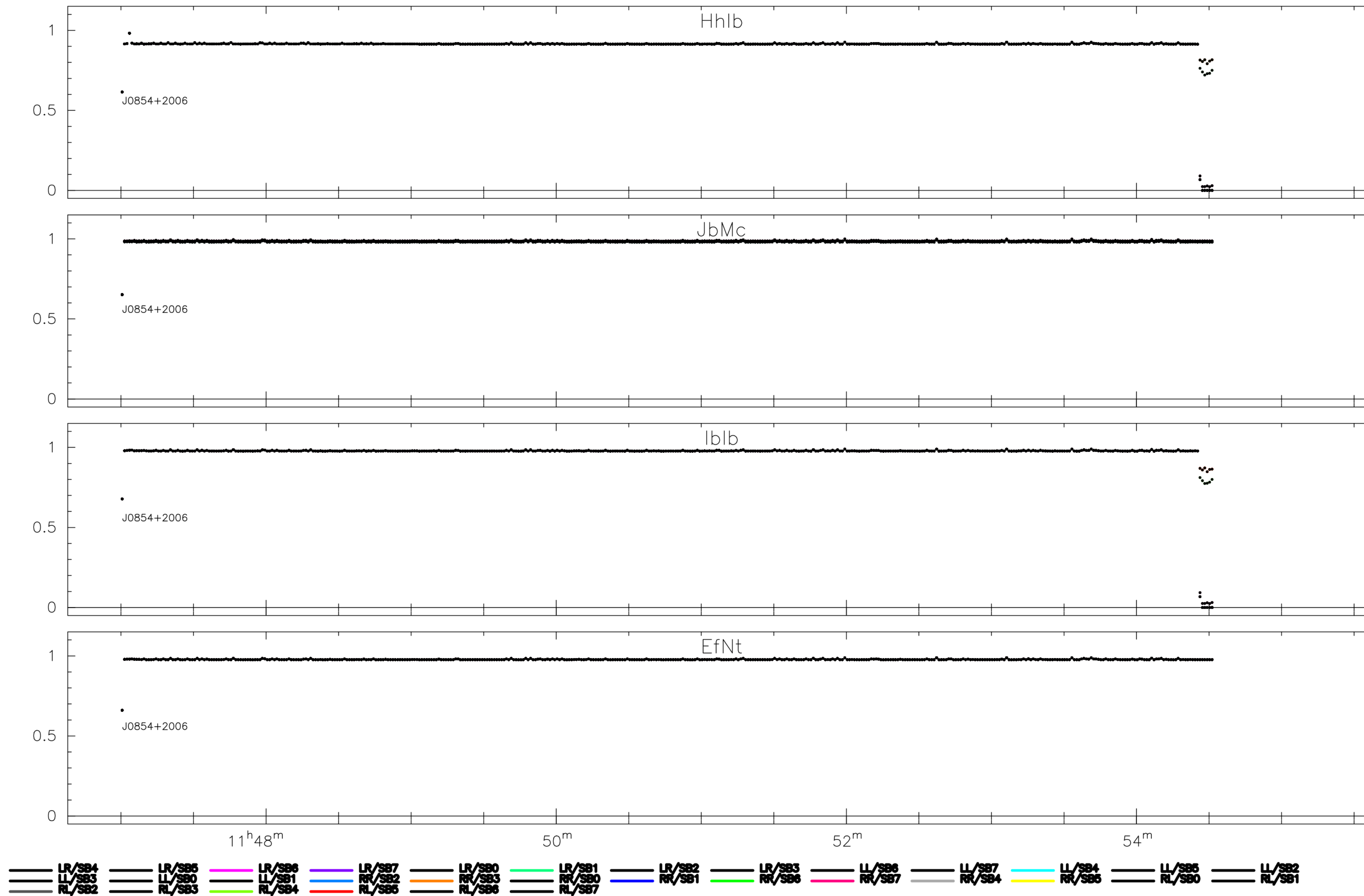
```
data: 221471.ms [DATA]
```

unique: sess218.C1024e/J0854+2006

verkout@<??> 2019-08-12T15:55:40

Pol=RL,LL,LR,RR;Nsub=*;;Ch=*;

page: 1/7



EG102E

weight versus time

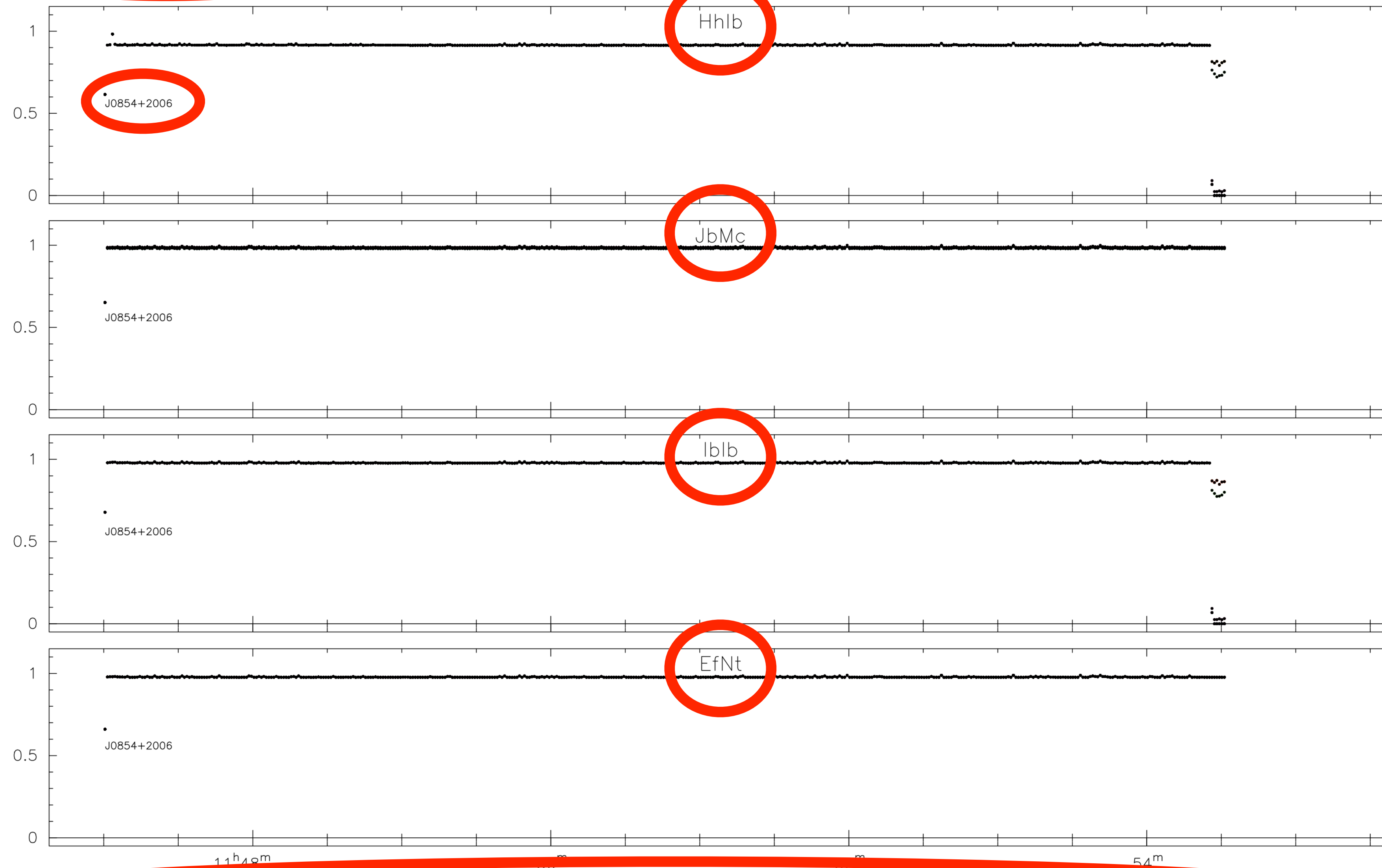
unique: sess218.C1024e/J0854+2006

Pol=RL,LL,LR,RR;Nsub=*;;Ch=*

data: 221471.ms [DATA]

verkout@<??> 2019-08-12T15:55:40

page: 1/7



Legend for the plots:

LR/SB4	LR/SB5	LR/SB6	LR/SB7	LR/SB8	LR/SB9	LR/SB10	LR/SB11	LR/SB12	LR/SB13	LR/SB14	LR/SB15	LR/SB16	LR/SB17	LR/SB18	LR/SB19	LR/SB20	LR/SB21	LR/SB22	LR/SB23	LR/SB24	LR/SB25	LR/SB26	LR/SB27	LR/SB28	LR/SB29	LR/SB30	LR/SB31	LR/SB32	LR/SB33	LR/SB34	LR/SB35	LR/SB36	LR/SB37	LR/SB38	LR/SB39	LR/SB40	LR/SB41	LR/SB42	LR/SB43	LR/SB44	LR/SB45	LR/SB46	LR/SB47	LR/SB48	LR/SB49	LR/SB50	LR/SB51	LR/SB52	LR/SB53	LR/SB54	LR/SB55	LR/SB56	LR/SB57	LR/SB58	LR/SB59	LR/SB60	LR/SB61	LR/SB62	LR/SB63	LR/SB64	LR/SB65	LR/SB66	LR/SB67	LR/SB68	LR/SB69	LR/SB70	LR/SB71	LR/SB72	LR/SB73	LR/SB74	LR/SB75	LR/SB76	LR/SB77	LR/SB78	LR/SB79	LR/SB80	LR/SB81	LR/SB82	LR/SB83	LR/SB84	LR/SB85	LR/SB86	LR/SB87	LR/SB88	LR/SB89	LR/SB90	LR/SB91	LR/SB92	LR/SB93	LR/SB94	LR/SB95	LR/SB96	LR/SB97	LR/SB98	LR/SB99	LR/SB100
--------	--------	--------	--------	--------	--------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	----------

jplotter:

focus on data selection



Label	Is short for	Description
TIME	TIME	The time stamp of the data point
SRC	SOURCE	The name of the associated FIELD of this data point
BL	BASELINE	The baseline on which this data point was measured
FQ	FREQUENCY GROUP	The frequency group name (a.k.a. the frequency setup name observing mode)
SB	SUBBAND	The subband number within the frequency setup $0..n_{subband}-1$
P	POLARIZATION	The (human readable) polarization combination of the data point
CH	CHANNEL	The channel number of the data point $0..n_{channel}-1$

jplotter:

focus on data selection

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CH	CHANNEL	The channel number of the data point $0..n_{channel}-1$


```
jcli> bl auto
```

```
baselines: EfEf JbJb McMc NtNt YsYs HhHh IbIb
```

```
jcli> bl (ef|ys)* -auto -hh +(hh)ys
```

```
baselines: EfJb EfMc EfNt EfYs EfIb JbYs McYs NtYs YsHh YsIb
```

```
jcli> bl (ef|ys)* -auto -hh +(hh)ys
```

```
baselines: EfJb EfMc EfNt EfYs EfIb JbYs McYs NtYs YsHh YsIb
```

1. Select all baselines to **Ef** and **Ys**

2. remove all autocorrelations

3. remove baselines to **Hh**

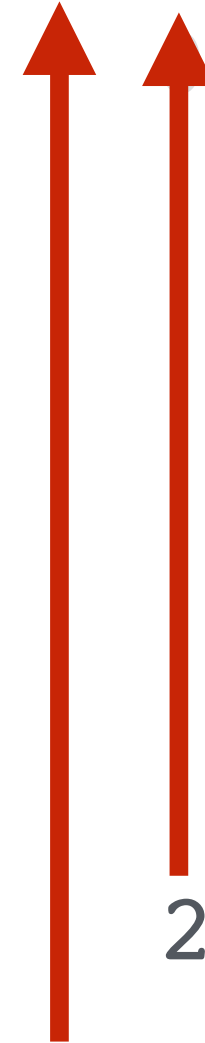
4. but add **Hh-Ys** back in


```
jcli> fq */p
```

```
freqsel: 0/0:7/0:RR,LL
```

```
jcli> fq */p
```

```
freqsel: /0:7/0:RR,LL
```

- 
1. Select **all subbands** (frequency bands)
 2. and subselect all **parallel** polarizations

```
jcli> fq */p
```

```
freqsel: /0:7/0:RR,LL
```

1. Select **all subbands** (frequency bands)
2. and subselect all **parallel** polarizations

Same command also works for **XX**, **YY** polarization
(or **HH**, **VV** if CASA will support that)!


```
jcli> fq 1:3/rr,rl
```

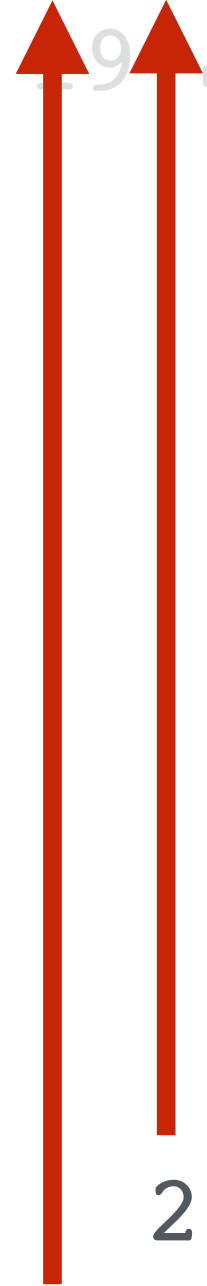
```
freqsel: 0/1:3/0:RR,RL
```

```
jcli> time 0/11:51:00 to 19-6-2018/11h52m0s
```

```
time:      19-Jun-2018/11:51:00.000 -> 19-Jun-2018/11:52:00.000
```

```
jcli> time 0/11:51:00 to 19-6-2018/11h52m0s
```

```
time: 19-Jun-2018/11:51:00.000 -> 19-Jun-2018/11:52:00.000
```

- 
- 2. **H:M:S** time format
 - 1. **Day offset** wrt day of observation


```
jcli> time 0/11:51:00 to 19-6-2018/11h52m0s
```

```
time: 19-Jun-2018/11:51:00.000-> 19-Jun-2018/11:52:00.000
```

3. **D-M-Y** date format

4. **00h00m00s** time format

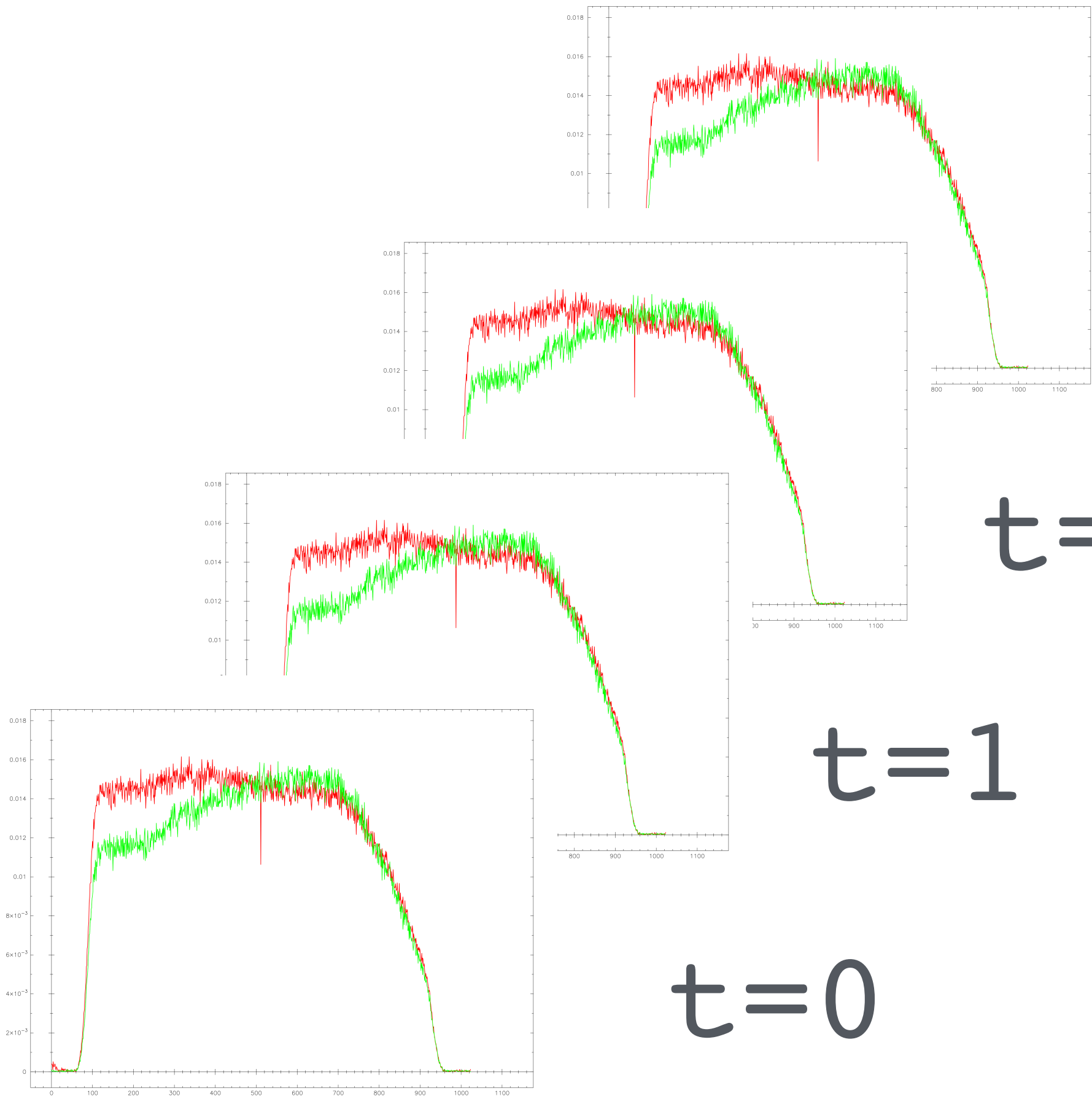
```
jcli> time $start + 1m10s to +30s
```

```
time:      19-Jun-2018/11:48:10.500 -> 19-Jun-2018/11:48:40.500
```

```
jcli> time $start + 1m10s to +30s
```

```
time: 19-Jun-2018/11:48:10.500 -> 19-Jun-2018/11:48:40.500
```

- 
1. **\$start, \$end, \$mid** always dynamically computed from time range of current MS!
 2. supporting **arithmetic**
 3. with **0d0h0m0.0s** time *durations*



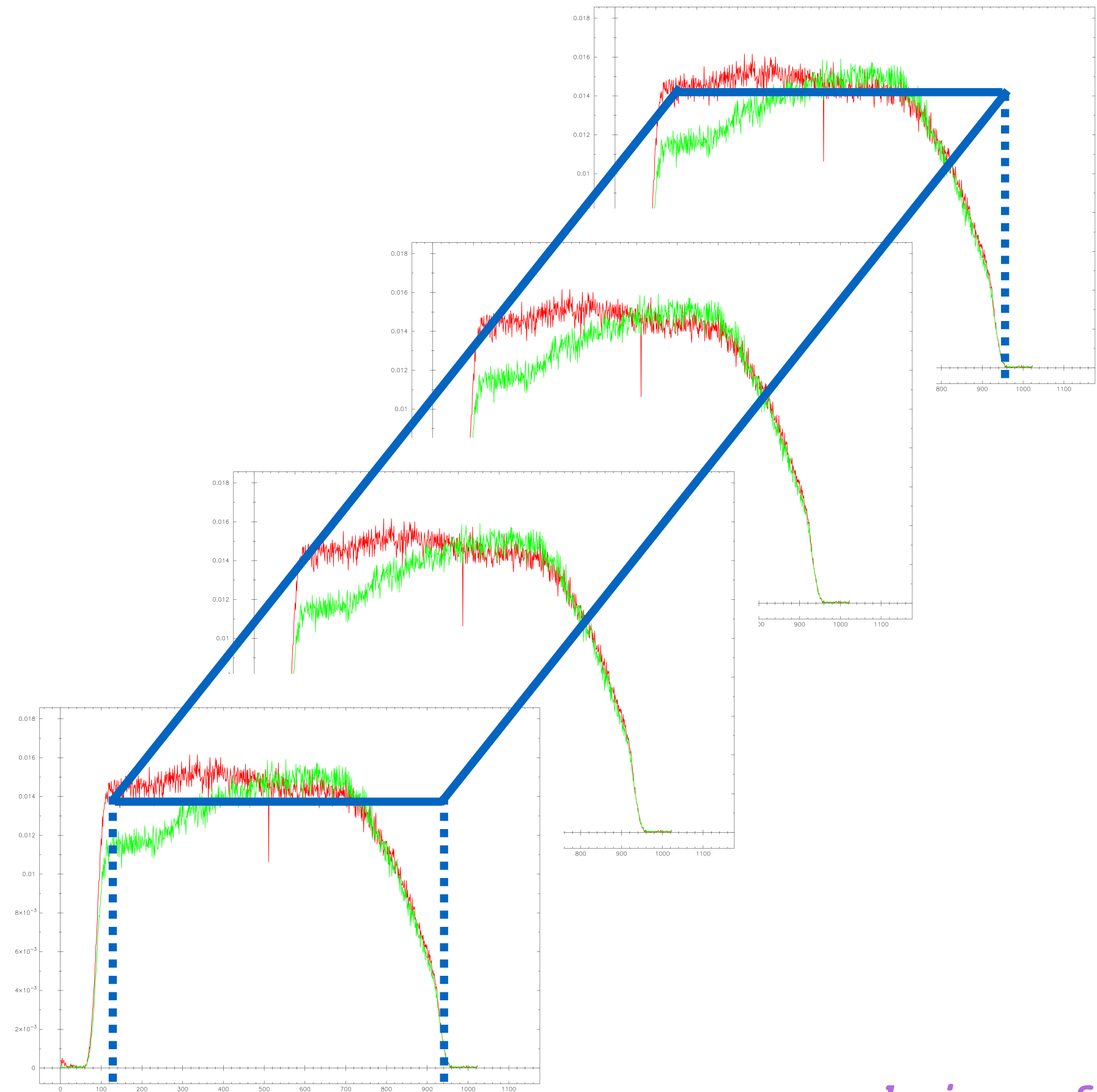
$t=3$

$t=2$

$t=1$

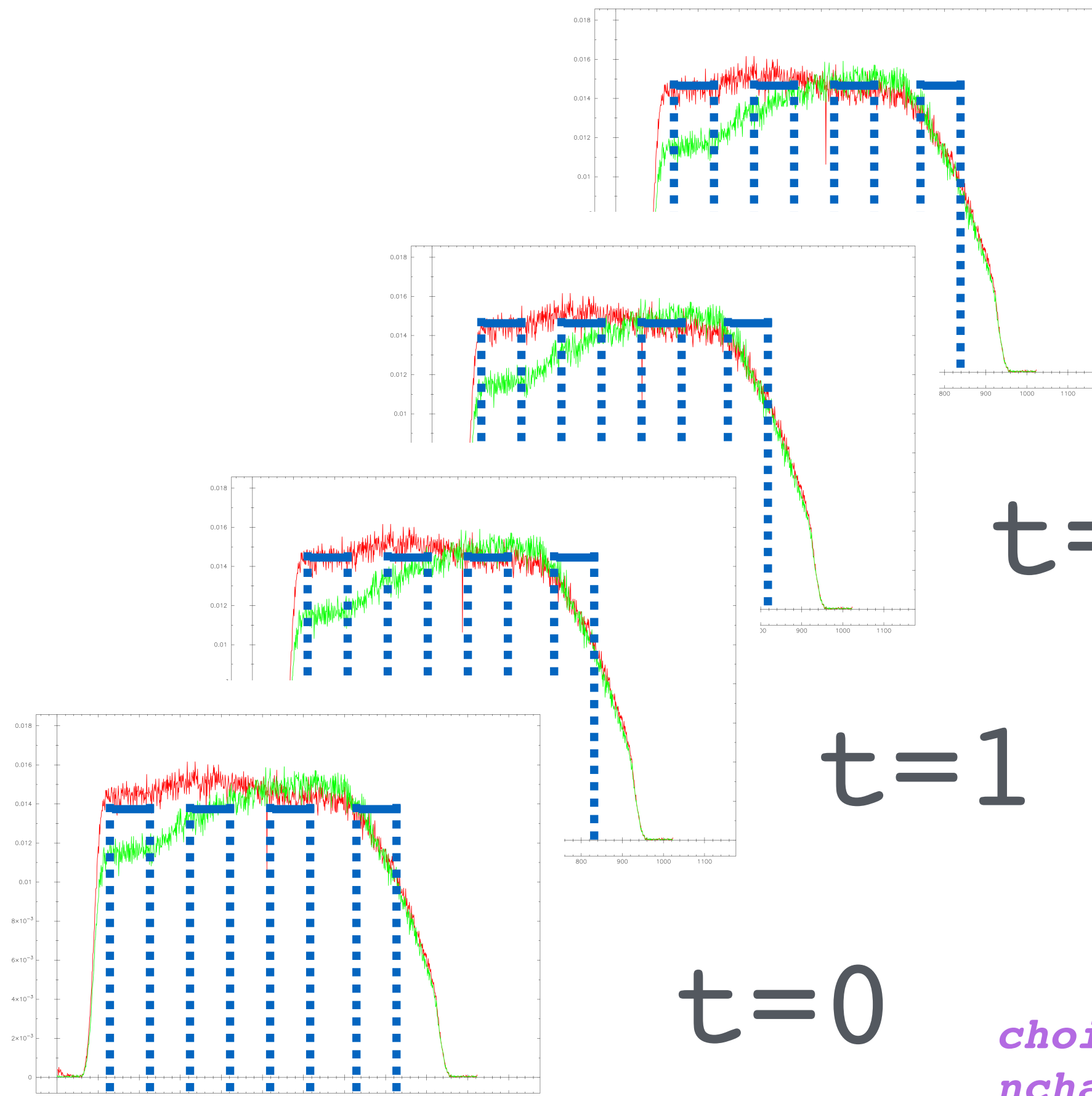
$t=0$

jcli> avt scalar



*avt = average time
choice of "vector" or "scalar"*

```
jcli> avc vector; nchav 2;
```



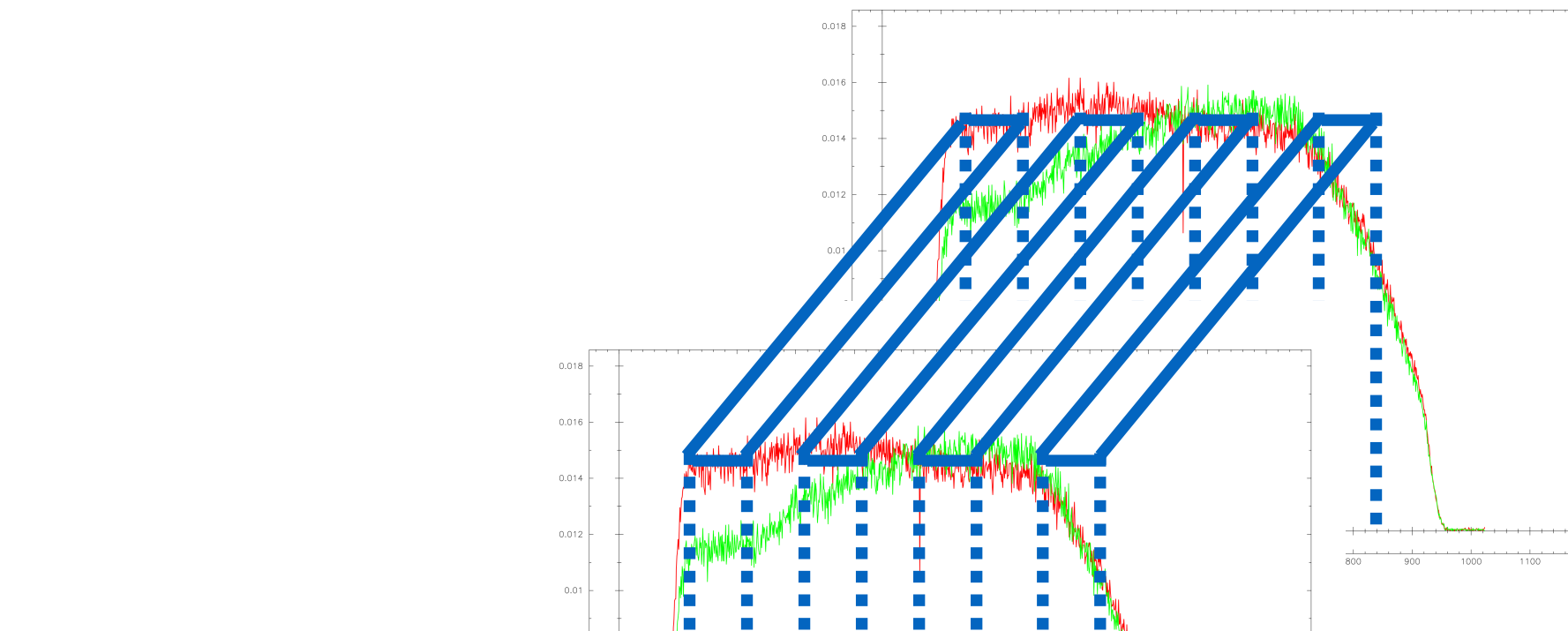
$t=3$

$t=2$

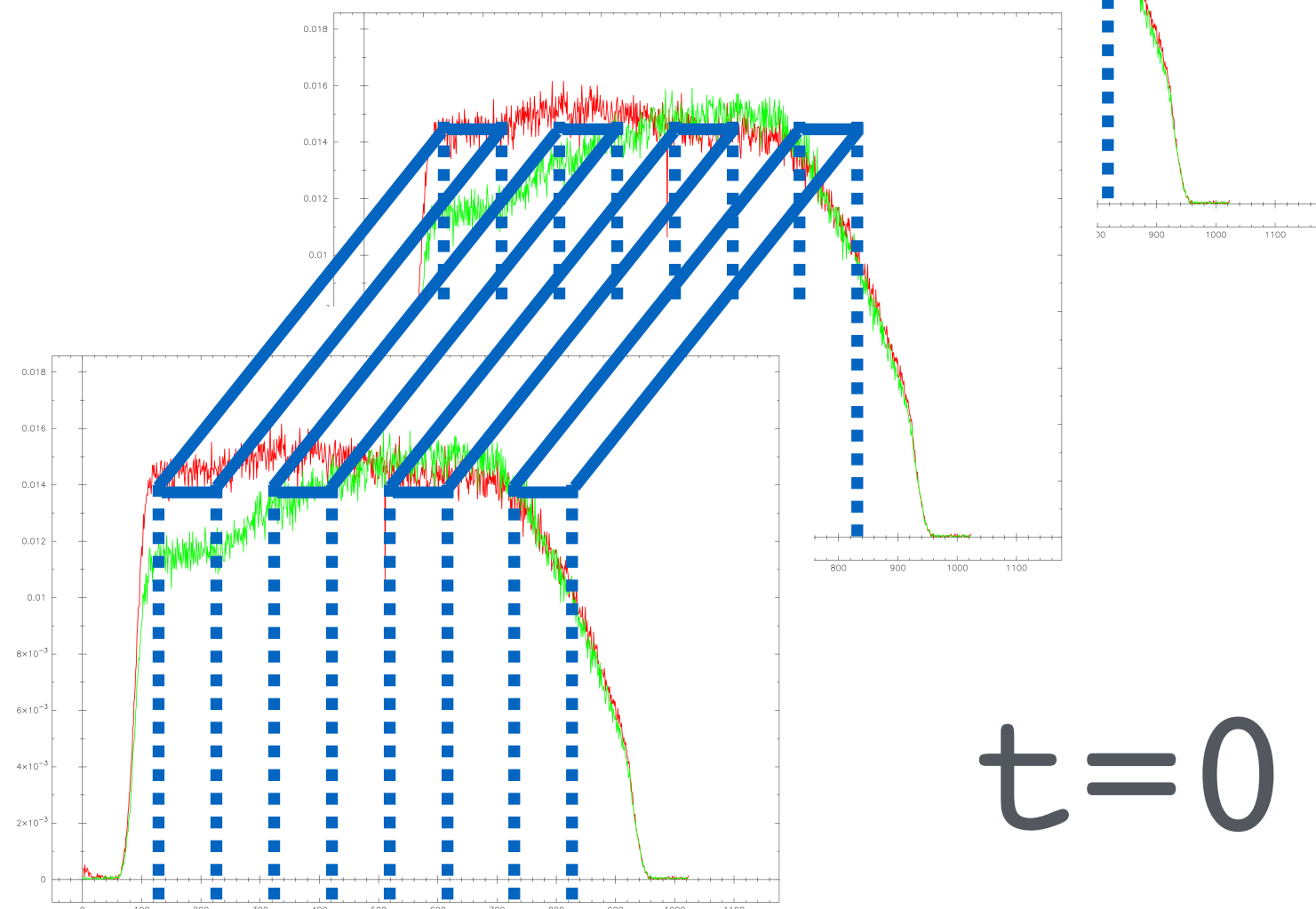
$t=1$

$t=0$

*avc = average channel
choice of "vector" or "scalar"
nchav = #-of-channels averaged*



$t=2$



$t=0$

```
jcli> help fq
```

```
jcli> help fq
```

```
fq [none | [[freqids/]subbands[/[polid:]polarizations]]*]  
    set/display current frequency/polarization selection
```

Without arguments displays the current frequency selection and returns.

The special selector 'none' clears the current frequency selection.

In order to understand this command you should familiarize yourself with how the system reads the frequency setup/subband and polarization from the MS and presents it to you. Read the documentation for the range command "r". Part of


```
jcli> help fq
```

```
fq [none | [[freqids/]subbands[/[polid:]polarizations]]*]  
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```
jcli> help fq
```

```
fq [none | [[freqids/]subbands[/[polid:]polarizations]]*]  
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```
jcli> help fq
```

```
fq [none | [[freqids/]subbands[/[polid:]polarizations]]*]  
    set/display current frequency/polarization selection
```

Without arguments displays the current frequency selection and returns.

The special selector 'none' clears the current frequency selection.

<<< snip >>>

Examples:

0,3/0:4/1*

select pols LL+LR from subbands 0->4 from both FREQID 0 and 3

1/1:3,6:8/X

select available cross pols from subbands 1->3 and 6->8 from FREQID 1

0/1:RR

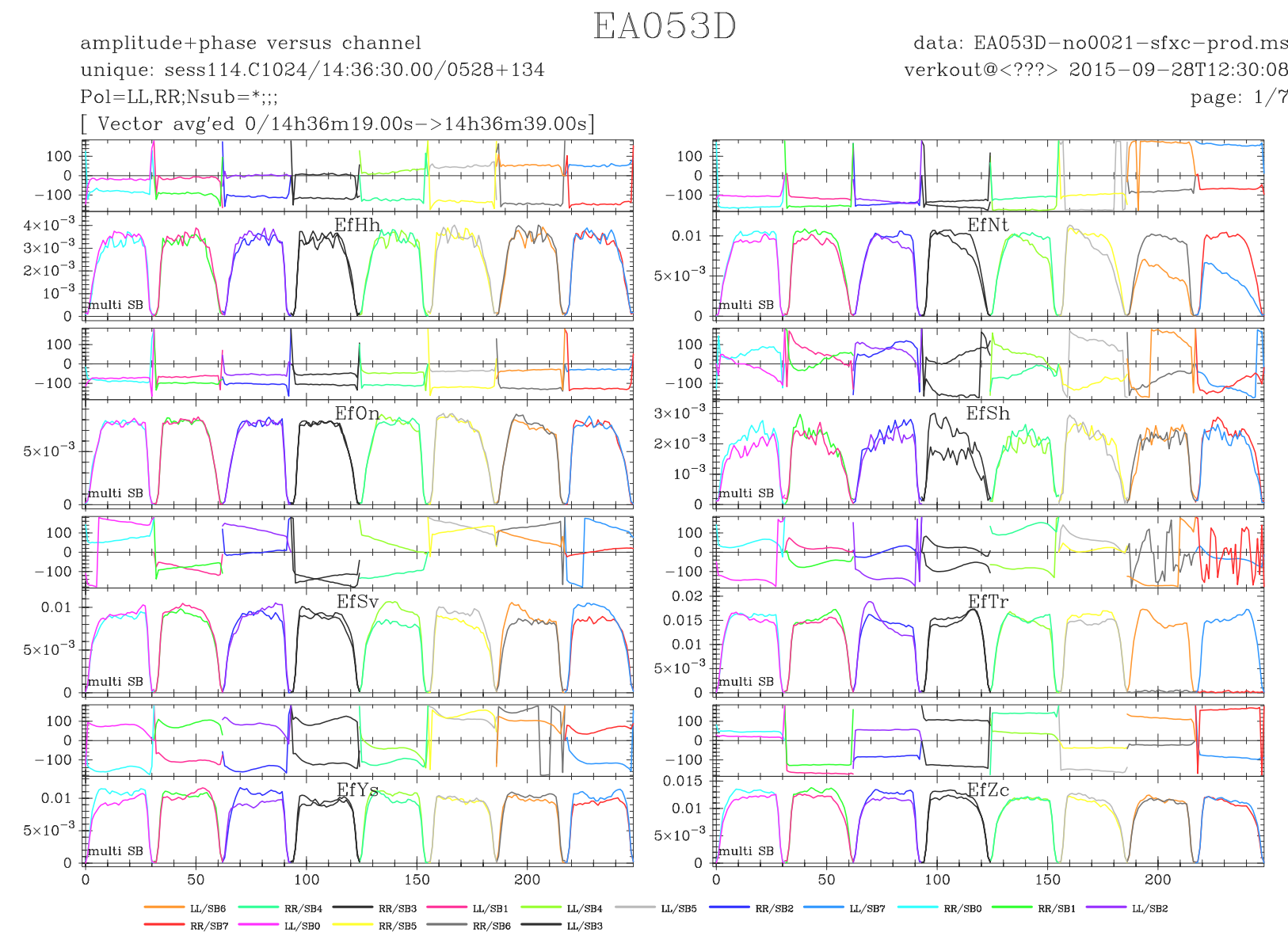
select polarization RR from polarization ID 1, from subband 0 from the default FREQID (this will only work when there's only one FREQID in the MS)

Telephone: +31 (0) 592 596500
Fax: +31 (0) 592 596539

26 September 2015

TO: Distribution
FROM: Harro Verkouter (verkouter@jive.eu)
SUBJECT: cookbook ***draft v2*** for *jplotter* v0.4 and higher

https://github.com/haavee/jiveplot.git
as /doc/jplotter-cookbook-draft-v2.pdf



1. The *jplotter* program

The *jplotter* program is a Python based program for displaying fundamental properties of (time/frequency averaged) radio-astronomical data stored in Measurement Sets (MS)¹, e.g. amplitude and/or phase of the complex data as function of time, frequency or UV-distance, as witnessed above.

This document aims to describe the high-level ideas and features of the program and installation instructions for the dependencies rather than just documenting the commands; specifically because the program comes with all command documentation built-in and available at runtime.

¹ The Measurement Set is both a data-model description as well as an implementation of this model in C++ in the Common Astronomy Software Applications package (CASA) - <http://casa.nrao.edu/Memos/229.html>

- multi-window support
 - visualise/compare multiple data sets
 - or same data set from multiple “angles”
- very flexible organization
 - separate data into plots/datasets
 - sorting of plots, layout on screen
 - programmable data set colouring
- handles flagged data
 - under all combinations of averaging
 - options to (not) read/show/hide flagged data
- insert own Python postprocessing func
 - after data read, before display, dynamically loaded
- automation methods
 - defining macros
 - play scriptfile w/ arguments
 - read commands from Python generator/list
- output to file
 - PGPLOT backend: PostScript
 - Giza backend: PDF, PNG, PostScript
- batch plotting direct to file (no X11)
- write out current selection as new MS

Live demo

Setting up a Python "venv"

Create a directory to keep Python "venvs"

```
$> mkdir -p ~/venvs
```

```
$> cd ~/venvs
```

Now create a Python "venv"

(choose a descriptive name)

```
$> python3 -m venv jplotter
```

Activate it

```
$> . ~/venvs/jplotter/bin/activate
```

tada!

```
(jplotter)$>
```


Installing jplotter (from jiveplot)

```
# The 'jiveplot' package is on PyPI  
# https://pypi.org/project/jiveplot/  
# should work out of the box!  
(jplotter)$> pip3 install jiveplot
```

```
# You now should have the 'jplotter' program
```

```
$> jplotter
```

```
+++++ Welcome to cli +++++  
$Id: command.py,v 1.16 2015-11-04 13:30:10 jive_cc Exp $  
  'exit' exits, 'list' lists, 'help' helps  
jcli> _
```



Start typing commands here!

Now ... create your own Diagnostic Plots

https://jradcliffe5.github.io/sfxc_workshop_2025/



“Post-correlation processing”
(correlation_post.html)



“Data inspection using **jiveplot**”
(correlation_post.html##data-inspection-using-jiveplot)

```
jcli> lp
Known plot-types:
phatime => phase versus time
rnichan => real+imag versus channel
imchan  => imag versus channel
ampfreq => amplitude versus frequency
uv      => V versus U
imtime  => imag versus time
phafreq => phase versus frequency
anpfreq => amplitude+phase versus frequency
amptime => amplitude versus time
anptime => amplitude+phase versus time
ampchan => amplitude versus channel
rechan  => real versus channel
wt       => weight versus time
retime  => real versus time
anpchan => amplitude+phase versus channel
ampuv   => amplitude versus UV distance
rnitime => real+imag versus time
phachan => phase versus channel
```

