

# EVN TOG video meeting

February 8, 2022

# Agenda

1. **Opening Remarks (Bach)**
2. **Approval & last minute additions to Agenda (all)**
3. **Acceptance of minutes from last meeting (all; [Minutes from April 2021 meeting](#))**
4. **Review of Action Items from last meeting (all; see [Action Items from last meeting](#) )**
5. **Review of Permanent Action Items (all; see [Permanent Action Items](#))**
6. **Reliability/Performance of the EVN**
  1. Reliability/Performance of the EVN. (JIVE support scientist)
  2. NME results (JIVE support scientist)
  3. Feedback from last sessions. (JIVE support scientist)
  4. Amplitude calibration. (JIVE support scientist)
7. **Recent difficulties/problems/failures**
  1. Anything to report about backends, recorders, receivers? (all)
8. **Recent solutions**
  1. Using the FS holog program to measure beam maps (Bach)
9. **Recorders: Mark 5, Mark6, Flexbuf**
  1. Disk inventory and purchase status, 500 TB per stations + 500 TB at JIVE (Bach, all)
10. **Stations**
  1. Any news from stations? (All)
  2. Status of VLBI at FAST (Chen)
  3. The RFI monitoring program at Yebes (Bautista)
11. **JIVE: eVLBI and operations**
  1. The centralized real-time EVN monitoring system (Keimpema)
  2. Technical Operations and R&D at JIVE (Verkouter)
12. **Technical Developments**
  1. The new wide band CX-receiver at Yebes (Garcia-Miro)
  2. Update on the BRAND receiver (Rottmann)

# Recent difficulties/problems

- Any known problems?
- Schedules arrived very late into the session in 2021-3.  
Can we do anything on that?

# Measure Beam-Maps with holog

Took a long time to get started, but rather simple

1. Start FS
2. Load the corresponding receiver setup
3. point antenna to a suitable source
4. Specify holog parameter: *holog=azs,els,azp,elp,recal,proc,wait*
  - azs* Azimuth Span: -360. to +360, non-inclusive. No default.
  - els* Elevation Span: -90. to +90, non-inclusive. No default.
  - azp* Azimuth Points: positive or negative odd values 1-99.
  - elp* Elevation Points: positive or negative odd values 1-99.
  - recal* Re-calibration period. Seconds: 0-10000 or "off". Default 0="off"
  - proc* Snap procedure base name. See comments. No default.
  - wait* Seconds to wait for onsource for each point, 1-1000, default 120.
5. Start with *holog* (like with *onoff* and *fivept*)

# Measure Beam-Maps with holog

FS > holog=0.62,0.62,11,11,,holog,

```
define hologi      000000000000x
log=beammap
"astro16
" take 8 MHz at 21cm, because of RFI
astro8
!+30s
"caltsys
sy=go holog &
enddef
define hologp      000000000000x
data_valid=on
!+20s
data_valid=off
sy=go holog &
enddef
```

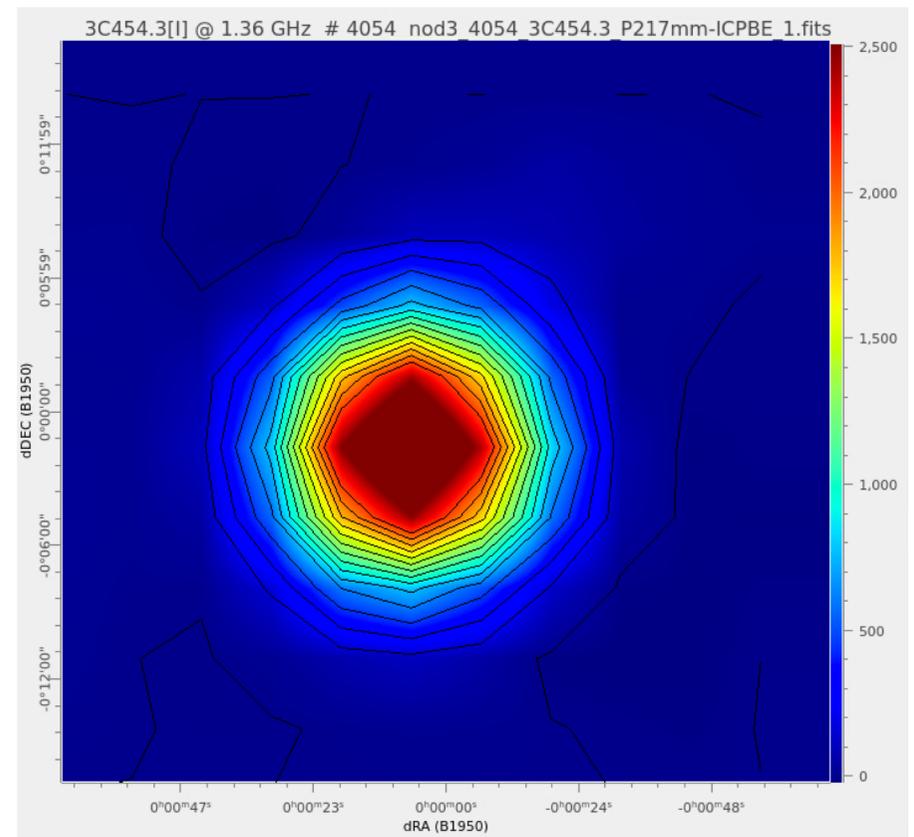
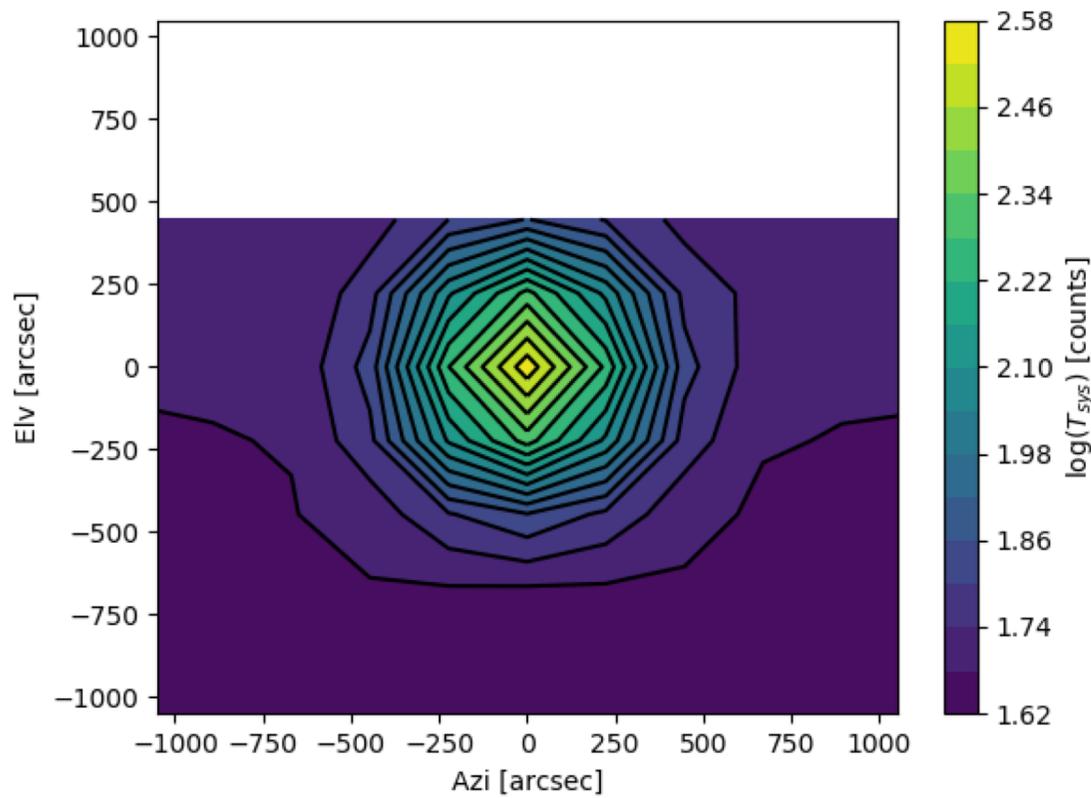
```
define astro8      0000000000000
pcaloff
tpicd=stop
fila10g_mode=,0xffffffff,,16.000
form=astro
bbc01=124.49,a,8.00
bbc02=140.49,a,8.00
bbc03=156.49,a,8.00
bbc04=172.49,a,8.00
bbc05=124.49,b,8.00
bbc06=140.49,b,8.00
bbc07=156.49,b,8.00
bbc08=172.49,b,8.00
ifa=2,agc,2,48000
ifb=4,agc,2,48000
lo=loa,1230.00,usb,rcp,off
lo=lob,1230.00,usb,lcp,off
cont_cal=on,2,4
bbc_gain=all,agc,16000
tpicd=no,200
tpicd
enddef
```

2022.033.15:21:15.99#antcn#>>SV NONE 3c454.3 22:53:57.8 16:08:54 1230.00 0 0 2000NON  
2022.033.15:21:46.05#holog#AzEI 221.23871 49.72737  
2022.033.15:21:46.05#holog#Origin 55274.2 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000  
2022.033.15:21:46.05#holog#Next -0.47956 -0.31000  
2022.033.15:21:46.05#antcn#Commanding new offsets -1726 -1116  
2022.033.15:22:12.02;hologp=-0.480\_-0.310  
2022.033.15:22:12.02&hologp/data\_valid=on  
2022.033.15:22:12.02&hologp/!+20s  
2022.033.15:22:12.02&hologp/data\_valid=off  
2022.033.15:22:12.02&hologp/sy=go holog &  
...  
2022.033.15:22:26.33#tpicd#tsys/1l,23.5,1u,23.3,2l,21.4,2u,22.9,3l,22.6,3u,22.6,4l,22.1,4u,21.9  
2022.033.15:22:26.33#tpicd#tsys/5l,22.1,5u,22.2,6l,21.9,6u,22.4,7l,22.0,7u,24.1,8l,25.1,8u,23.8  
2022.033.15:22:28.34#tpicd#tpcont/1l,19654,15794,1u,19488,15836,2l,19616,15767,2u,19359,15725,3l,19591,15745,3u,19404,15745,4l,19003,15938,4u,19078,15797,ia,1377.44  
2022.033.15:22:28.34#tpicd#tpcont/3u,18842,15469,4l,18987,15931,4u,18721,15523,ia,1388.91  
2022.033.15:22:28.34#tpicd#tpcont/5l,19550,15883,5u,19615,15930,6l,19727,16080,6u,19269,15779,7l,19321,15793,7u,19111,15993,8l,18930,16092,8u,18810,15812,ib,2861.15  
2022.033.15:22:28.34#tpicd#tpcont/7u,19100,15974,8l,18906,16065,8u,18808,15813,ib,2866.86  
2022.033.15:22:30.35#tpicd#tpcont/1l,19638,15807,1u,19501,15837,2l,19635,15784,2u,19383,15728,3l,19591,15745,3u,19404,15745,4l,19003,15938,4u,19078,15797,ia,1377.44  
2022.033.15:22:30.35#tpicd#tpcont/3u,19177,15749,4l,18996,15930,4u,19044,15796,ia,1389.97  
2022.033.15:22:30.35#tpicd#tpcont/5l,19556,15875,5u,19632,15956,6l,19757,16077,6u,19271,15793,7l,19341,15793,7u,19111,15993,8l,18930,16092,8u,18810,15812,ib,2861.15  
2022.033.15:22:32.04#holog#Next -0.38365 -0.31000  
2022.033.15:22:32.04#antcn#Commanding new offsets -1381 -1116  
2022.033.15:22:50.77;hologp=-0.384\_-0.310  
2022.033.15:22:51.00#tpicd#tpcont/1l,19629,15792,1u,19475,15851,2l,19606,15754,2u,19404,15745,3l,19606,15745,3u,19404,15745,4l,19003,15938,4u,19078,15797,ia,1377.44  
2022.033.15:22:51.00#tpicd#tpcont/3u,19190,15758,4l,19003,15938,4u,19078,15797,ia,1377.44

# Measure Beam-Maps with holog

```
FS > holog=0.62,0.62,11,11,,holog,  
FS > holog
```

```
FSPC > fs_beammap.py beammap.log <bbc id>
```



# Recorders and Flexbuffs

## Storage media capacity

- Good progress has been made to achieve the goal of 2x500 TB Flexbuff capacity (station and JIVE) for 4 Gbps operation.
  - Stations that have bought new space and have sufficient capacity at the station and JIVE: Ef and Ys
  - Stations that have bought new space and have sufficient capacity at the station: Jb, KVN, Mc, Mh, Nt, On, Sr, and Tr.  
But have to upgrade space at JIVE. **This is in progress for most of the stations.**
  - Stations that still need to upgrade are Hh, Ir, Km, Kvazar stations, Ur, and Wb.
- Mark5 stations that cannot do 4 Gbps: Ur? and Kvazar stations.

**In summary, 15 from 21 stations (counting antennas not institutes) in this list are able to observe at 4 Gbps. A limit of 2 Gbps exists at WSRT, Quasar stations, and Urumqi.**

# DBBC3

- More DBBC3s become available.
- The hardware, software, and firmware have seen significant improvements. DBBC3 was used reliably in the last EHT session (64 Gbps) and produced good results during GMVA observations at 4 Gbps in DDC mode using 16x64 MHz BBCs.
- A general DDC Firmware is available: DDC V125 U which is fully compatible with current EVN modes.
- Ongoing developments for
  - V126 U including some improvements (like high resolution TP for a better representation with continuous cal).
  - V126 E which is a version dedicated to the EVN, having 8 bbcs and improved filter shapes.
  - V126 I which allows data input from the 10G ports. Useful for BRAND and other digital receiver, with the possibility to perform the polarization conversion linear/circular.

# EVN Technological roadmap

- Driven by the EVN Vision report that outlines the scientific goals for the next years (VLBI20-30, <https://arxiv.org/abs/2007.02347>)
- Based on this document the most important improvements would come from
  - Higher bandwidth, increased frequency coverage/flexibility
  - More antennas
  - Higher cadence, more observing time
  - Wide field
  - Phased array feeds
  - Short baselines
  - Polarization improvements.
  - Large FoV archive, raw data storage.

# EVN Technological roadmap

- To reach this, the following recommendations have been made:
  - All EVN stations to purchase a DBBC3-L2H2 as soon as possible (or a compatible digital backend).
  - All EVN stations to purchase more storage space.
  - Equip stations with wide-band receivers: e.g. C/X 4-9 GHz, Triple-Band (22/43/86 GHz), BRAND (1.5-15 GHz).
  - Actively support new stations with advice and possibly with equipment.
  - Upgrade internet connections to 10 Gbps for eVLBI.
  - Actively monitor RFI.

# EVN Wiki page updates

Receiver frequency ranges:

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Frequency\\_ranges\\_for\\_2%2F%2F4\\_Gbps](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Frequency_ranges_for_2%2F%2F4_Gbps)

Disk inventory:

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Disk\\_Inventory](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Disk_Inventory)

Recorder/Flexbuff status (2 pages):

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Mark6%2F%2FFlexbuff\\_status](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Mark6%2F%2FFlexbuff_status)

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/Recorders\\_EVN\\_status](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/Recorders_EVN_status)

2 Gbps and 4 Gbps status:

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/2Gbps](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/2Gbps)

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/4Gbps](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/4Gbps)

eVLBI status:

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/e-VLBI\\_Status](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/e-VLBI_Status)

EVN Spare parts

[https://deki.mpifr-bonn.mpg.de/Working\\_Groups/EVN\\_TOG/EVN\\_spare\\_parts](https://deki.mpifr-bonn.mpg.de/Working_Groups/EVN_TOG/EVN_spare_parts)