

The first Transient Buffer Board trigger of an astrophysical source

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for the Transients and Cosmic ray KSP

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Jan David Mol
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Joeri van Leeuwen

Science goal

- Search for astrophysical fast transients
 - Sub-second
 - Bright
 - (Quasi-) Non-periodic (One time events)
 - Rare (large FOV, long observation time)
- What are they (pulse shape)
- Where are they (position)

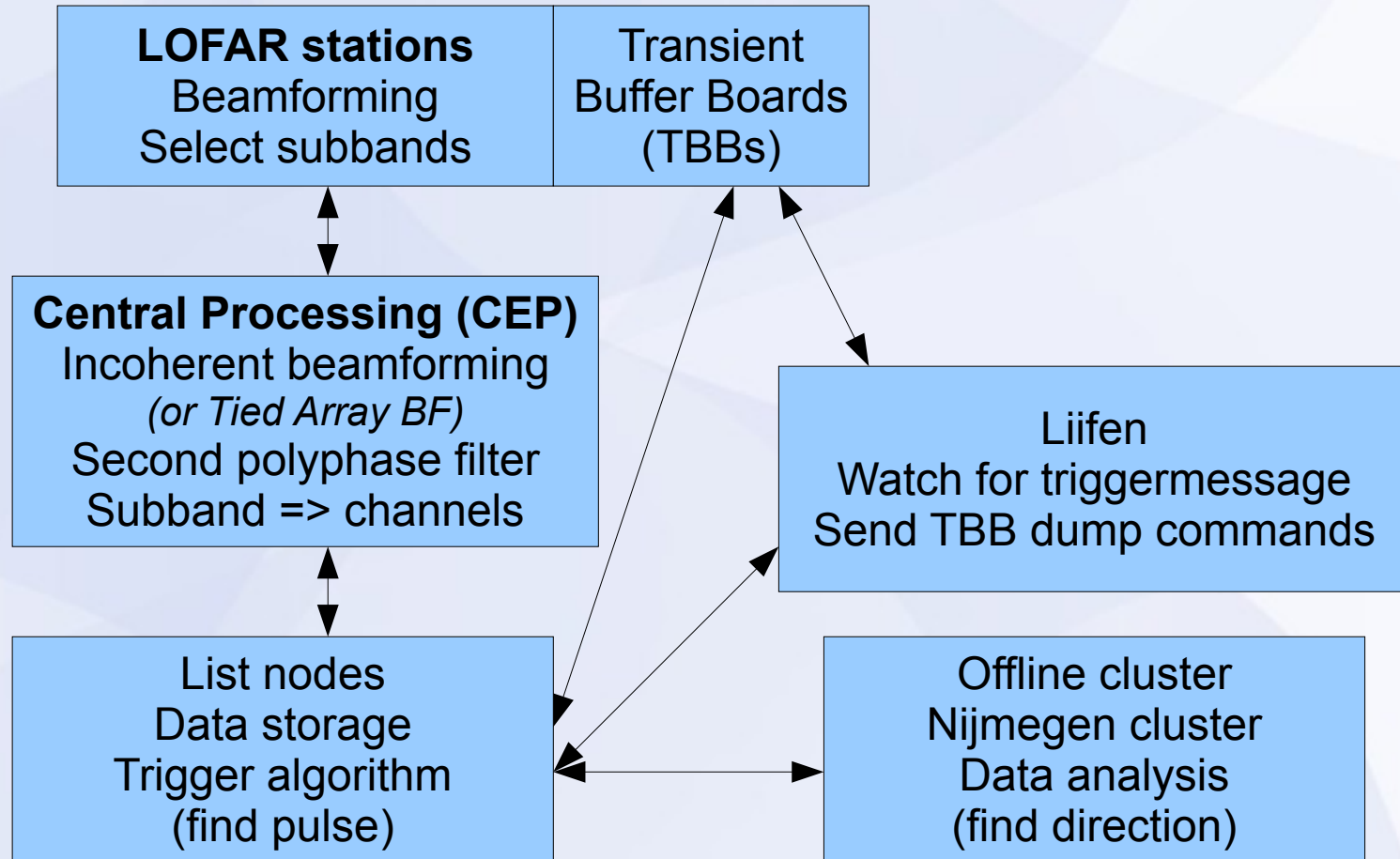
Development of a TBB trigger from Crabs Giant Pulses

- Method:
 - Find flash in incoherent beam
 - large FOV
 - Piggyback mode
 - Dump TBB information
 - determine position “repoint telescope”
- Test source for trigger development
 - Giant Pulses from the Crab pulsar

History

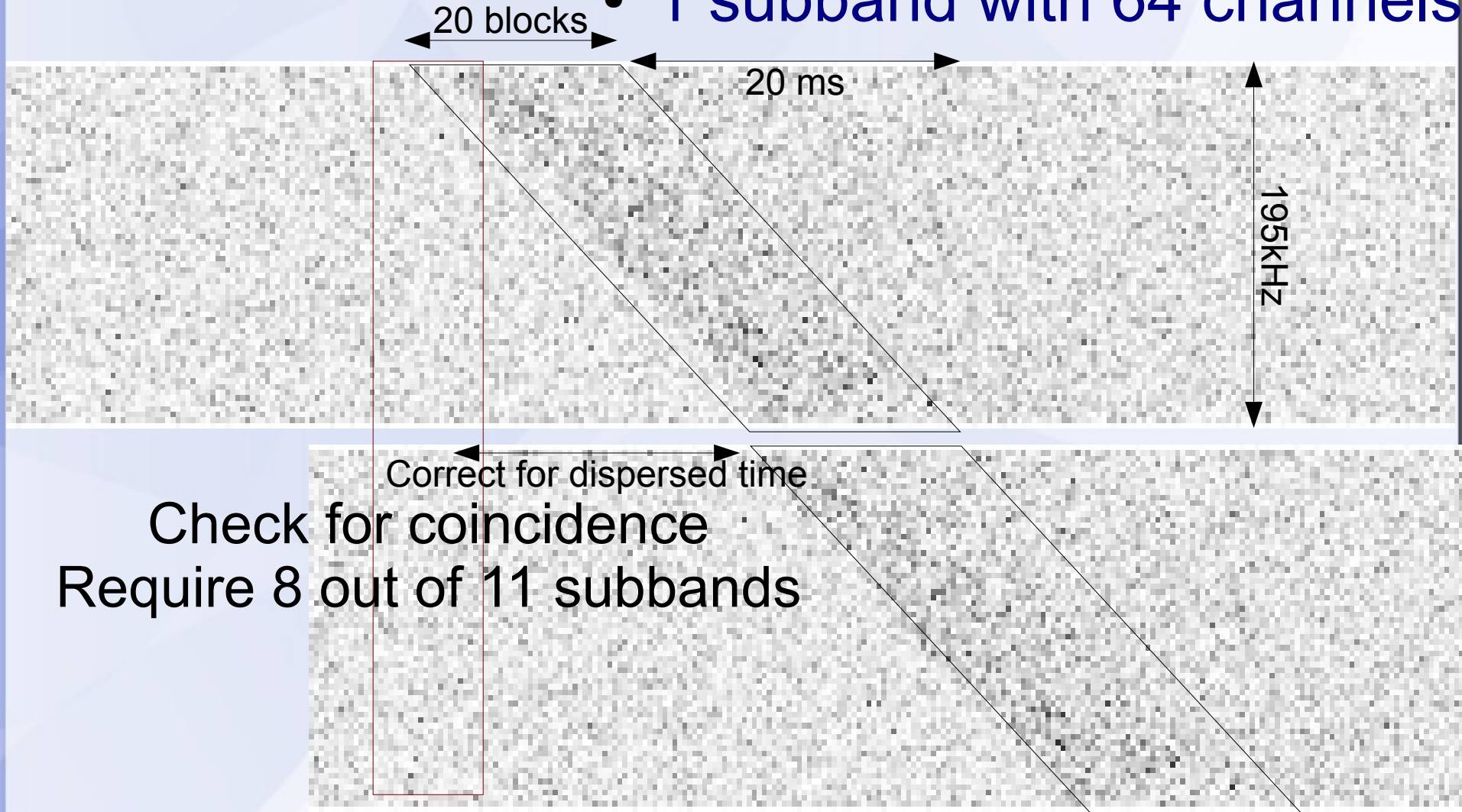
- May '09 work out the method
- July '09 get beamformed data
- July-Aug '09 development trigger algorithm
 - See also LSM 2 sept.
- Okt '09 portation to realtime trigger
- 28 Okt '09 1am-6am LST Real-time trigger observation

Observation diagram



Trigger method

- 1 subband with 64 channels



What do we need?

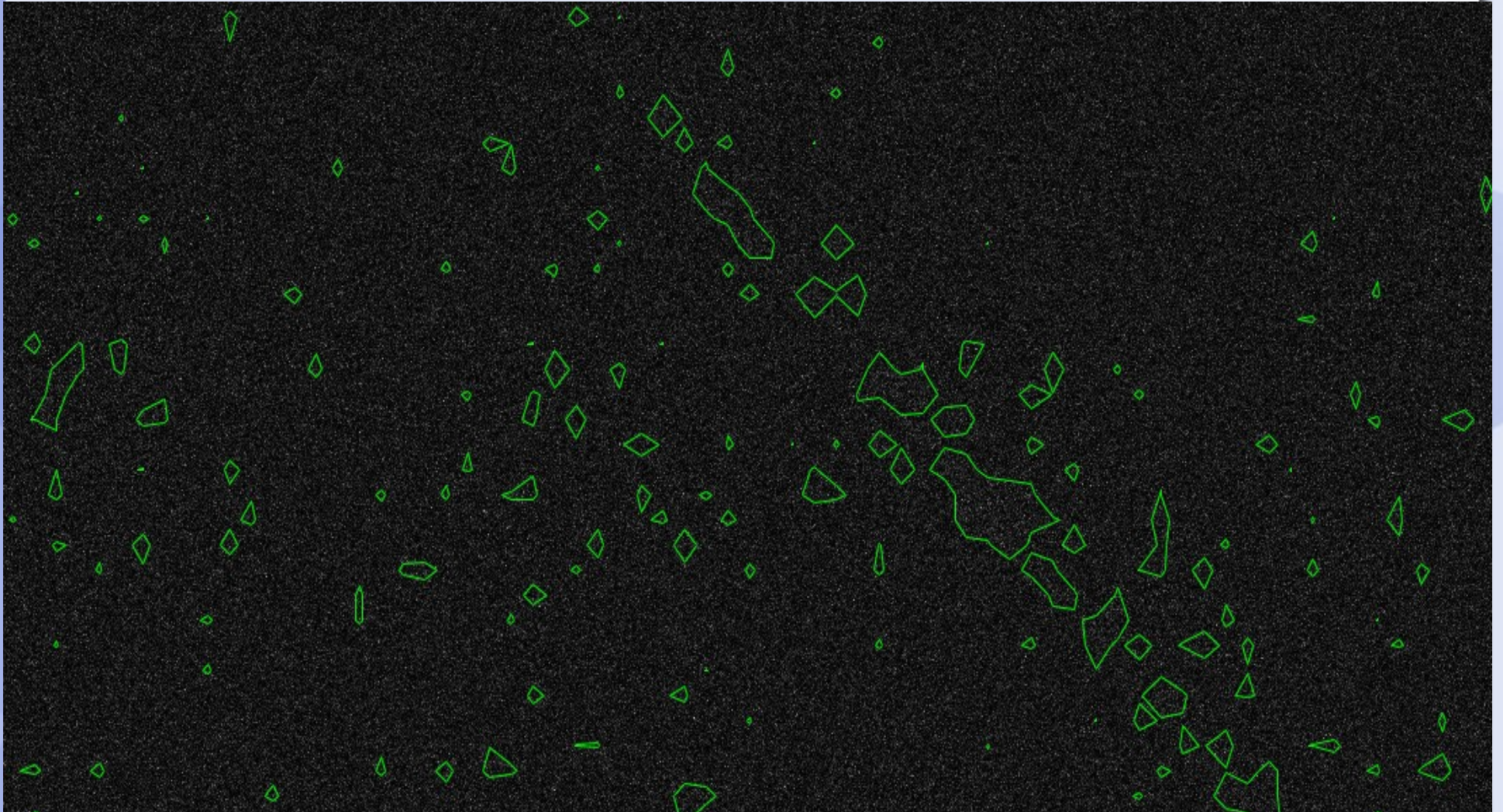
- Station for beamforming
- Station to obtain TBB data from
- BG/P, Place to store data
- Trigger program
- Scripts to dump TBBs
 - Week before dumptime from 48min – 25min
- Test run

What can go wrong?

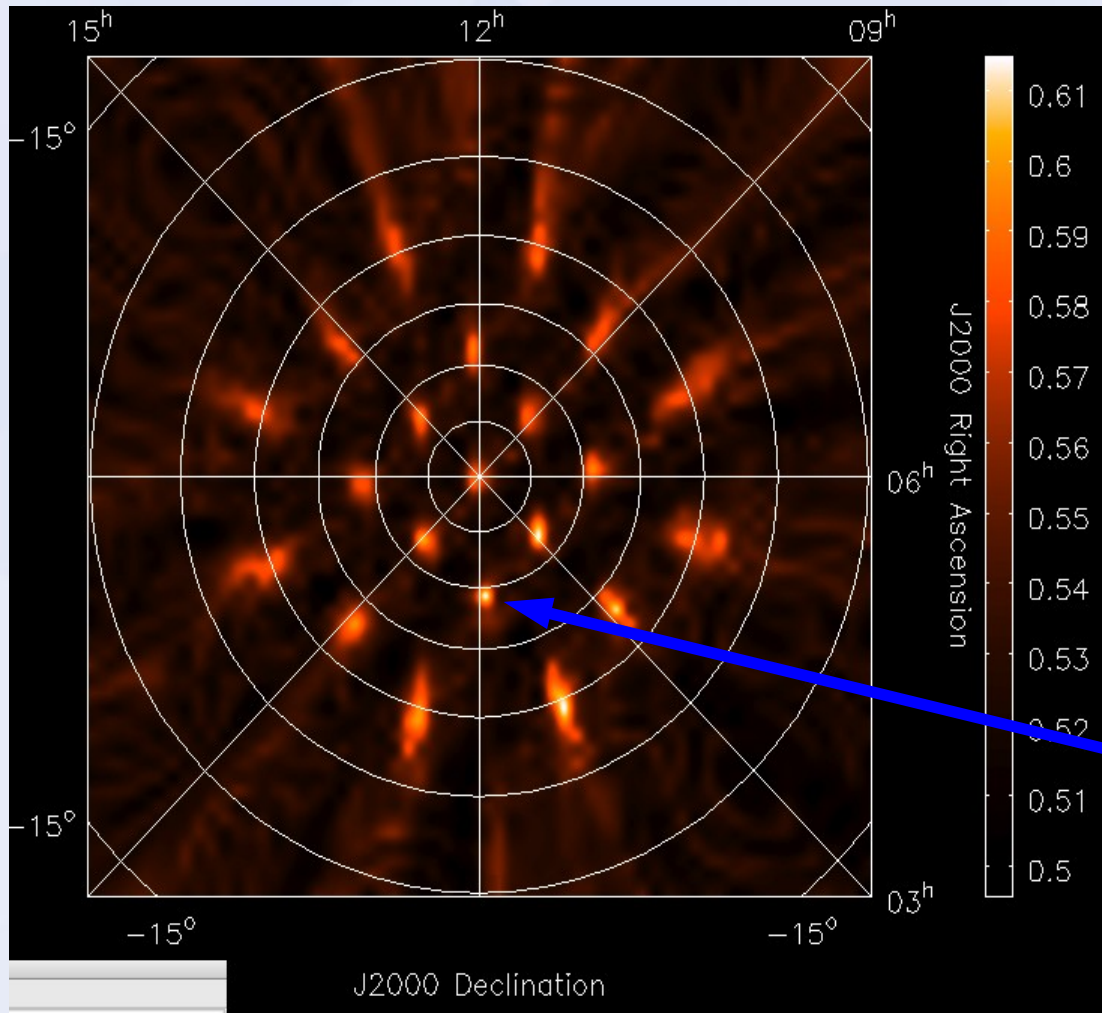
- Station to obtain TBB data
 - Perfect station in use (16:00)
 - Find another way to dump (23:45)
- BG/P, Place to store data
 - Had to use new cluster (14:00)
- Trigger program
 - New raw data structure (21:00)
 - Calculated average wrong (04:00)

28 october 2:49:18 UTC

First TBB trigger on GP



TBB All sky image



- 1 HBA ear
 - 140-160 Mhz
 - Broadband
 - Should find the pulse
- Position Crab Nebula

Statistics

WITHOUT INCOHERENT BEAMFORMING!

- 4 triggers / 20 minutes
- 5 dumps, but 1 mistake
- 4 pulses found

Time	Station	Triggertime	TBBdelay
2:49:18	CS302	3.0s	1.7s
3:40:38	CS302	3.6s	2.3s
6:12:27	RS503	2.3s	1.0s
6:30:36	CS302	2.3s	1.0s

Future work

- Analyze TBB data
 - Find dispersed pulse
 - Use skymapper and other beamforming
- Generalize trigger algorithm
 - Work with other bandwidths
 - Work with more DMs
- Move trigger to BG/P
- Move TBB control to MAC/SAS