

EoR KSP POINTS

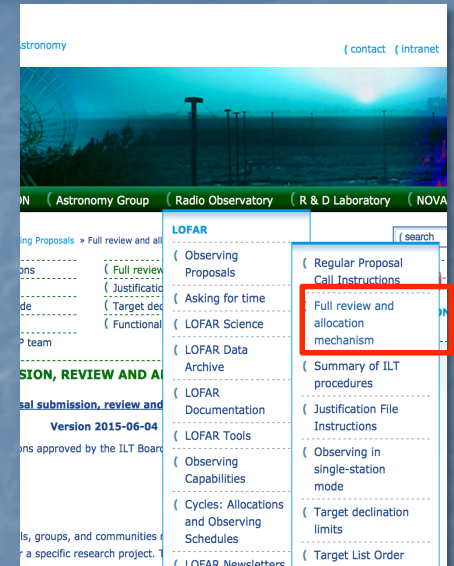


- **More attention to still significant scatter in CS sensitivity:** not seen in station calibration output plots. Different diagnostic plots/calibration methods needed
- **Improved delays for CS:** Improved procedure has been identified and is in progress.
- **R&D work to improve models for the element and station beams:** see M. Brentjens' talk
- **Fast switching between HBA and LBA (60s → 10s):** some work in MAC required to make all status changes run within 10 sec. It will need to be prioritized.
- **Possibility to observe in RCU mode 6:** it is possible.

SURVEYS KSP POINTS : PROPOSALS



- **Little benefit from long-term proposal mechanism:**
 - allocation rules for Consortia and PC apply – see <http://astron.nl/radio-observatory/astronomers/requesting-observations-and-data/lofar-announcement-opportunities-early>
 - Competition with other LT projects
 - scientific ranking plays an important role during the PC meeting
- **NorthStar issues** – will be addressed in debugging session in May
- **Time between receiving proposal feedback and finalizing plans is too short:**
 - affecting projects in exceptional cases
 - Review process is complex and involves many groups – cannot not be made shorter.
 - Technical feedback is forwarded asap after PC meeting to those projects that need to apply important setup changes
 - When needed, observations for the project can start a few weeks later
 - Level of detail in PC feedback – to be discussed
- **Flexibility in choosing targets:** selection should be in line with what proposed. Strategy changes need to be requested to and approved by the director

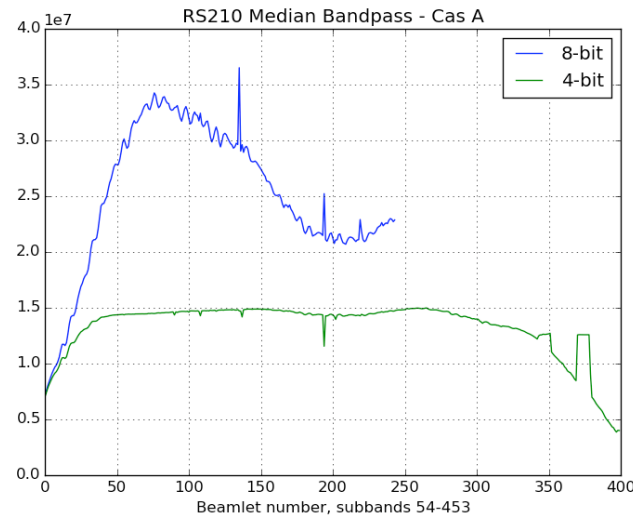
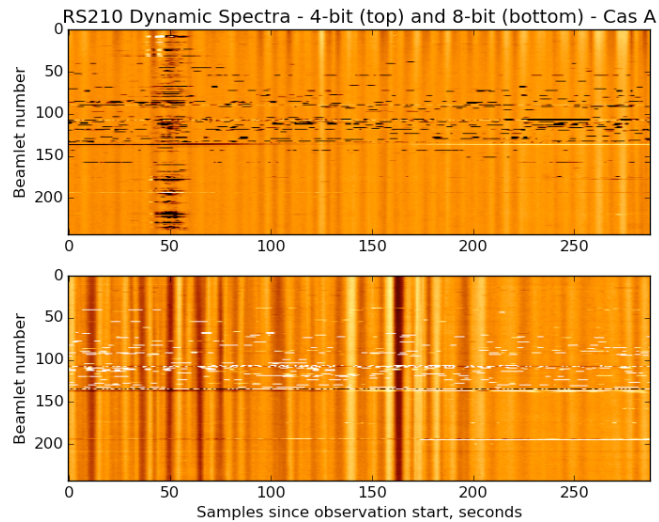


SURVEYS KSP POINTS: OBSERVING



- LBA sparse – caltables in progress
- Better description of ionospheric conditions during observing runs
 - might require dedicating a station for monitoring
 - Alternative approaches will be discussed at an ionospheric workshop in Poland in June
- 4-bit mode:
 - possible at correlator level – commissioning highlighted issues that need to be addressed
 - Note that observing at double the speed will not be sufficient if the digestion of data out of CEP is not improved as well -> robustness and reliability!

SURVEYS KSP POINTS: 4-BIT OBSERVING



HBA:

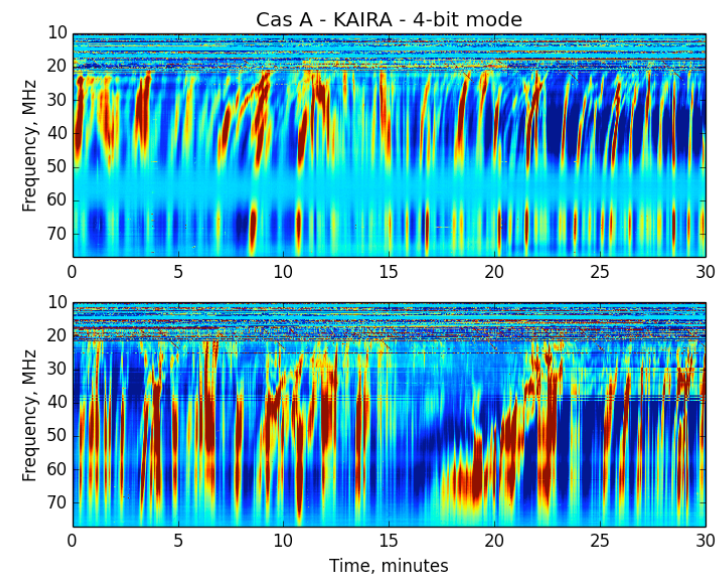
Sensitivity appears severely reduced

RFI appears as dips rather than spikes

LBA (KAIRA tests):

Peak response saturates unless maximum attenuation applied (7.75dB)

Some aliasing evident: can be mitigated by use of 30-70MHz filter



SURVEYS KSP POINTS: DATA INGEST



- RO running generic pipelines for users:
 - being prioritized
 - LTA processing resources should be explored, maybe initially in a manual fashion and later through the centralized system. Details at

<http://astron.nl/radio-observatory/observing-capabilities/depth-technical-information/cep-and-lta-computing-facilities>

- New scheduling system offers more flexibility for different pipelines and other processing facilities
- **User ingest mechanism:** being prioritized. A few special cases will be implemented first (EoR available; next Surveys T1 + DRAGNET)

The screenshot shows the LOFAR website's 'Radio Observatory' section. The main content area is titled 'LOFAR TECHNICAL INFORMATION' and contains introductory text about the LOFAR telescope and its capabilities. Below this, there are several navigation menus. On the left, there is a 'Major Observing Modes' menu with items like 'Interferometric Mode', 'Beam Formed Mode', and 'Direct Storage Mode'. On the right, there is a 'GENERAL' menu with items like 'PC pages', 'Special projects', and 'People'. A red box highlights the 'CEP and LTA computing facilities' link in the 'GENERAL' menu. The top navigation bar includes links for 'Home', 'About ASTRON', 'Astronomy Group', 'Radio Observatory', 'R & D Laboratory', and 'NOVA'.

SURVEYS KSP POINTS: RETRIEVING DATA



➤ Can scripts be made available to interact with the LTA?

It is possible to interact with the LTA using scripts. Link given in 'howto' page

➤ http://www.lofar.org/wiki/doku.php?id=public:lta_tricks

➤ Any network security issue would need to be addressed

➤ The download rate from the LTA is very slow:

➤ Retrieval using HTTP should be possible at up to 100 megabyte per second. Retrieval using srm/gridftp should be possible at up to 1 gigabyte per second. Staging will likely be somewhere between these rates. If slow speeds are experienced consistently, they need to be investigated. If slow speeds are experienced consistently they will need to be investigated.

➤ test dataset on each site can be downloaded to check download speed. If these results in slow transfer rates, first thing to check is the local network connectivity

LOFAR Operations Wiki

Advanced ways to find and retrieve data in the LTA

There are some useful ways to find and retrieve your data in the LTA that might not be immediately obvious. This page explains some of the more advanced options you have.

Queries

• You can use colons in numeric queries, to select ranges. This will for example give all observations and pipelines that have a SAS/Observation ID in the range from 432000 to 432100:

Observation Id: 432000-432100

Observing or Pipeline Run Date: From 0000-00-00 00:00:00 To 0000-00-00 00:00:00

Project: any

Maximum Number of Rows: []

In textual entries, wildcards can be used.

Target Name: *SP*

• You can put a list of SAS/Observation IDs in the query:

Observation Id: 146112,147775,151778

Observing Date: From 0000-00-00 00:00:00 To 0000-00-00 00:00:00

Viewing data

When you are looking at the results of a query you might see something like this:

Number Of Correlated DataProducts: 0 / 488

This means that the observation is known in the LTA, it knows what data was produced, the produced data was not archived, but further processing happened on the raw data and the results of some of those pipelines were archived. If you click on the zero, you will see something like this:

#	DataProduct Identifier	SubArray Pointing Identifier	Subband	Stations	Observations	Pipeline	Derived DataProducts
1	7260485	293855	479	show	1		AveragingPipeline
2	7260483	293855	477	show	1		AveragingPipeline
3	7260488	293855	482	show	1	back to	AveragingPipeline
4	7260489	293855	483	show	1	observation	AveragingPipeline
5	7260492	293855	486	show	1		AveragingPipeline
6	7260490	293855	484	show	1		AveragingPipeline
7	7260493	293855	487	show	1		AveragingPipeline
8	7260486	293855	480	show	1		AveragingPipeline

Can not be downloaded

SURVEYS KSP POINTS: DOING SCIENCE



- Installation LOFAR software at external computing facilities -> people have succeeded by following [online documentation](#); Users can contact RO for support and this can be provided on a best effort basis. Note that additional processing resources are available at SARA and Juelich

<http://www.astron.nl/radio-observatory/observing-capabilities/depth-technical-information/computing-facilities/computing->

- Software improvements and pipeline development should continue within CITT – this is the plan
- Beam model issues – requires input Tammo Jan
- Remove BBS and use only NDPPP: - in progress, see presentation Tammo Jan

LOFAR Operations Wiki

LOFAR User Software

This page will redirect you to build instructions for the LOFAR common software packages. Unfortunately there are two confusing names for two very different software bases:

- LOFAR Software → the package used and maintained by ASTRON containing control software, pipelines, Awimager, AOFlogger; this is the package developed and elaborated and used in the LOFAR production environment
- LUS (LOFAR User Software) → package maintained by the KSPs (Key Science projects) containing the pulsar pipelines tools, the Cosmic Ray tools, etc.

[edit](#)

LOFAR (Offline) Software

LOFAR Releases and installed production versions

- Release notes for LOFAR Offline software versions
- Overview of currently installed LOFAR versions on CEP.

[edit](#)

Retrieve and build Instructions

There are basically two ways to obtain the LOFAR Offline software.

One is to fetch the source code directly from the LOFAR repository and do it all yourself. This requires that your system has a bunch of libraries installed already, or that you need to install these as you go. This is for people who are somewhat familiar with installing packages and building your own code using CMake.

- Instructions for how to obtain and build the LOFAR software tree from code.
- Notes on installing the LOFAR Software on different Systems.
- Ubuntu 14.04 LTS users can obtain precompiled LOFAR (and other) packages from [Gijs Molenaar's PPA repository](#).

[edit](#)

LUS

LUS build instructions

- LUS instructions (not up to date...)

[edit](#)

Dynspec

The Dynspec package (Dynamic Spectrum toolkit) can be downloaded and used as well.

- Documentation for the Dynspec Toolkit

[edit](#)

LoSoTo

- Installing Losoto in a Virtual environment on flits
- Installing Losoto in a Virtual environment on an ubuntu 14.04

[edit](#)

prefactor

- Documentation on how to install and use the Pre-facet-Calibration Pipeline

[edit](#)

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<ul style="list-style-type: none">- LOFAR User Software- LOFAR (Offline) Software- LOFAR Releases and installed production versions- Retrieve and build Instructions- LUS- LUS build instructions- Dynspec- LoSoTo- prefactor

SURVEYS KSP POINTS: KNOWING WHAT IS GOING ON



LOFAR

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- **Regular notifications about completed ingest jobs:**
 - E-mails about completed ingest jobs are not common practice since they require manual action – to be investigated whether they can be sent out automatically to contact authors. Automatic system e-mails may require some interpretation. Meanwhile, users are advised to check progress in MoM.

- **Communication of developments:**
 - Regular LSM presentations
 - Newsletters
 - E-mail notifications after software roll outs

- **Communication CITT issues and input for further developments: ...**

TRANSIENTS KSP POINTS - IMAGING



- **DDT proposals – technical setup cannot be entered.** Needs development and will be prioritized during May debugging session.
- **MoM: introduce summary of crucial settings:** Options are under investigation
- **LTA:**
 - **Data ingest – missing SBs:**
 - We feel that this happen quite rarely
 - Due to ingest system instability and/or feedback validation issue.
 - Afforded if within policy
 - Pressure to free up CEP2 and move on with operations
 - **Link programs ongoing for several semesters:** Improvements to LTA web interface will be considered on basis of LTA survey. We will take this point along.
- **More flexibility in observation/pipeline ID patterns:** Observation and pipeline IDs are set independently based on time of scheduling of tasks. Adding specific logic would be quite fragile and would restrict future development. Relevant information should be read by any processing software from the LOFAR Common Header that's available in all dataproducts we provide. If needed we are open to adding more information to that header. e.g. we could look into adding the Obs ID of the predecessor of the pipeline to the header.

TRANSIENTS KSP POINTS - IMAGING



- **Rapid response:** development of responsive telescope functionality will start this year.
- **Bypass LTA in case of key datasets:** is done if urgent. Make it clear to RO personnel
- **Rapid feedback when successful observations are completed:**
 - This is a manual action and is regularly performed the the working day following the observation
 - Urgency should be made clear
 - Validation plots are available for inspection as soon as the observation is completed
- **Commensal observing modes:** BF+IM is possible, within correlator limits
- **Latest imaging developments should go in RO pipelines:** being prioritized
- **Beam model issues** – addressed earlier

TRANSIENTS KSP POINTS - PULSAR



- **Ease of access and searchability of the LTA:**
 - LTA survey
- **Improved tied-array calibration table.** – Under investigation. Improved procedure has been identified and is in progress.
- **Monitoring of beam-formed data quality.** – Station dynamic spectra now available. Further beamformed inspection plots will be generated when using CEP4.

MAGNETISM KSP POINTS



- **Apply fix to data already in the LTA:** This will need to be discussed
- **More regular station calibration** -> Performed when required (e.g. maintenance, software changes), otherwise every 6 months.
- **Access to CEP3 not managed in a way reflecting student reality:**
 - Large number of requests to access CEP3 demands defined policies for access management
 - We should not go back to a CEP1 model
 - Special cases are understood
 - Extensions have been always awarded if properly justified
- **AWimager:** see T. J. Dijkema's talk
- **Installation of LoSoTo at external computing facilities is troublesome:** F. de Gasperin

COSMIC RAYS KSP POINTS



- TBB operational mode – implementation will start this year
- Low rate of triggers sent by LORA:
 - only 19 detectors
 - connectors problems: Coordination between KSP and O&M required
 - TBB observation statistics ->
 - TBB observations are scheduled to fill time between observations on weekdays from 17:00 and 8:00 and in week-ends.
 - Other time is required for tests and maintenance
 - This can be further improved with idle mode. This is being prioritized.

SOLAR KSP POINTS



- **Long term proposal important for solar KSP:** Long term requirements should be well justified and are ultimately judged by the program committee
 - Next opportunity cycle 7
- **Response time:** During working days, ToO observations can be scheduled within 24 hours after receiving the trigger. Responsive telescope functionality will improve this.
- **Dedicated spectrometer:** This can be proposed by a regular proposal and will then be evaluated by the PC

NON-KSP COMMUNITY: PROPOSING



- **Proposal call:**
 - **Envelope sheet:** joint TECHNICAL supplement when several specific science proposals aim to share parts of surveys or other larger overlapping sets of observations
 - **long-term proposals:** Science case whose observing campaign requires observing over several Cycles (4 maximum). Not linked to number of observing hours
- **NorthStar:**
 - **adding many targets:** file can be uploaded (max 300 obs)
 - Northstar development in May will start addressing reported issues
- **Standard observing setups:**
 - described on ASTRON web pages for both LBA and HBA:
<http://astron.nl/radio-observatory/astronomers/array-configurations/3-telescope-parameters-and-array-configurations>
 - Examples will be added to Northstar manual
- **Tool to check source/calibrator visibility etc...:** Internal discussion will define what can be provided and how to make it available. Currently, users can download the free iObserve app (for Macs):

<https://itunes.apple.com/us/app/iobserve/id424693907?mt=12>

one can define observatories in it and specify targets.

Observations with the Low Band Antennas (LBA):
Single observations that are continuous in time/Hour Angle:
- Half of the available bandwidth (BW) on the target field (BW <= 48 MHz, <= 244 subbands) and half on a calibrator (same frequencies as the target, BW <= 48 MHz, <= 244 subbands).
- Observations in the band of 10-80 MHz (either 10 MHz or 30 MHz filters are possible).
- Suggested range of correlator subbands is 114-357
- Processing performed with the Standard Imaging Pipeline or Pre-processing Pipeline.
- Suggested averaging factors are 8 channels in frequency and 5 seconds in time. More details are given in the sections below.

Observations with the High Band Antennas (HBA):
Observations can be specified in 4 different schemes, covering one of the 3 HBA bands: 110-190 MHz (with sampling clock 200 MHz), 170-230 MHz (with sampling clock 160 MHz) or 210-250 MHz (with sampling clock 200 MHz).

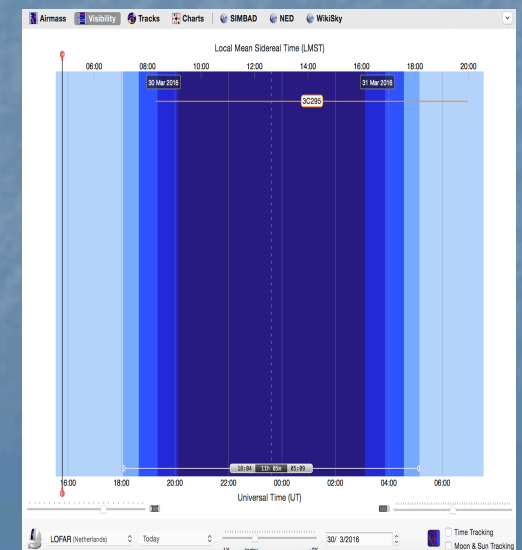
i) Continuous in time/Hour Angle observation of the target bracketed by short calibrator runs. Alternatively, one could adopt the LBA strategy (Half of the available bandwidth on the target field and half on a calibrator) when a bright calibrator is present within the analogue beam of the HBA tiles (up to ~10 degrees from the target).
- Processing performed with the Standard Imaging Pipeline or Pre-processing Pipeline.

ii) Two scans, one on the calibrator (5-10 min) and a long continuous run on the target.
- Up to the full available bandwidth (BW < 80 MHz).
- Processing performed with the Standard Imaging Pipeline or Pre-processing Pipeline.
- This is the optimal strategy to use if advanced faceted imaging (extreme peeling) needs to be used in the calibration process.

iii) Interleaved calibrator observations (eg. 2 min) with target field (eg. ~ 30 min), quasi-continuous in HA.
- Up to the full available bandwidth (BW < 80 MHz).
- Observations in one of two HBA bands: 110-190 MHz or 210-250 MHz
- Processing performed with the Standard Imaging Pipeline or Pre-processing pipeline.

iv) If the user has a good initial model of the target field at his/her disposal, observations could be performed using the full bandwidth on the target.
- Processing performed with the Standard Imaging Pipeline (Calibrator pipeline) Pre-processing Pipeline.

Suggested ranges of correlator subbands for observations in band 110-190 MHz are: 51-442 (i.e. 110-186 MHz) for continuous bandwidth, or the ranges 77-356 (i.e. 115-169 MHz), 358-396 (i.e. 170-177 MHz), 407-456 (i.e. 179-189 MHz) which exclude the known RFI bands. Suited ranges of correlator subbands for observations in band 170-230 MHz will be advertised soon (commissioning ongoing).



NON-KSP COMMUNITY: OBSERVING & DATA ACCESS



LOFAR

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- **Inspection plots download:** better...linked in MoM! In progress
- **Ionospheric issues during observing runs:** assessment to be improved, also discussed at ionospheric workshop in Poland in June
- **Scripting LTA staging requests:** discussed earlier
- **Staging time estimate:** too many variables in the equation
- **Access to calibration solutions in the LTA:**
 - long standing request – did not get high in priority list
 - For now, parmdb files made available separately upon request
- **CEP3:**
 - **access management:** see earlier discussion
 - **difficulty in getting keys to work/ difficulty with rsync:** to be discussed with cluster administrators

NON-KSP COMMUNITY: DATA REDUCTION



➤ Steep learning curve for new users:

- Data schools are organized every other year and are interleaved with ERIS schools, where LOFAR data reduction is also discussed
- LOFAR Cookbook should be used as a reference: update currently in progress – will deliver a new style manual with more tutorial material
- As stated in the proposal call, inexperienced users can request to visit ASTRON to get help with the reduction of their Cycle data. However, this can only be done on a best effort basis

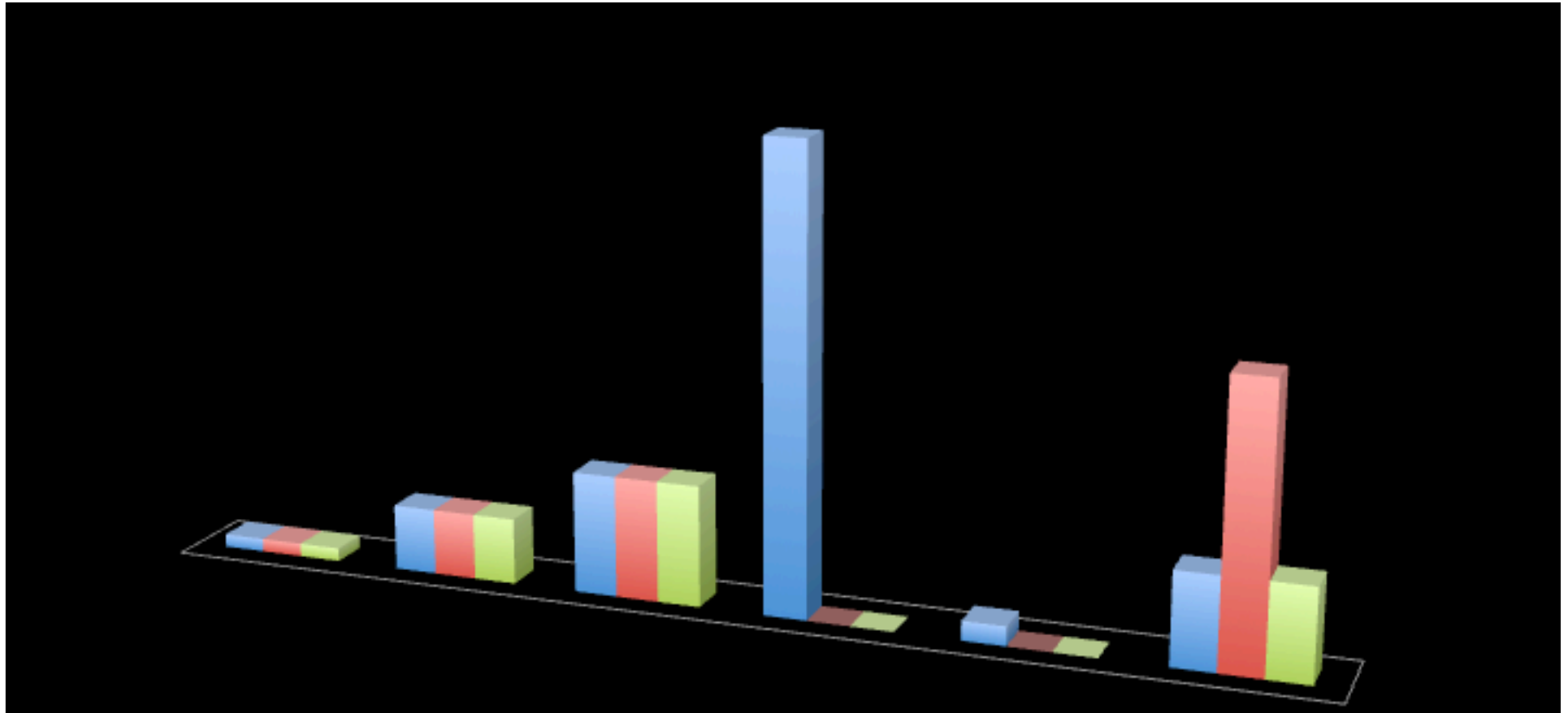
➤ Software:

- **NDPPP vs BBS:** Basic information will be added to the cookbook. Speed benchmarks can not receive priority at the moment.
- **Standard LBA calibration pipeline not sufficient:** CITT goal

➤ Installation LOFAR software:

- See earlier discussion
- Access to CEP3 needs to be requested in proposals

LT5 requests: fraction requested vs. available



Cycle 6

Cycle 7

Cycle 8