

◆ LOFAR Summary

-...

◆ LOFAR proposals

-Preparing for your own real data

- **LOFAR is a very diverse instrument**

- ✓ wide field of view

- >> degrees

- ✓ extended baselines

- >1000 km; $\sim 1''$

- ✓ broad spectral coverage

- up to 96MHz

- ✓ spectral line capabilities

- ✓ high time resolution

- $\sim 5\text{ms}$; down to 5ns

- **LOFAR data is difficult to handle...but not impossible!**

LOFAR Summary



- LOFAR is a very diverse instrument

- ✓ wide field of view

- >> degrees

- ✓ extended

- >1000 km

- ✓ broad spectral

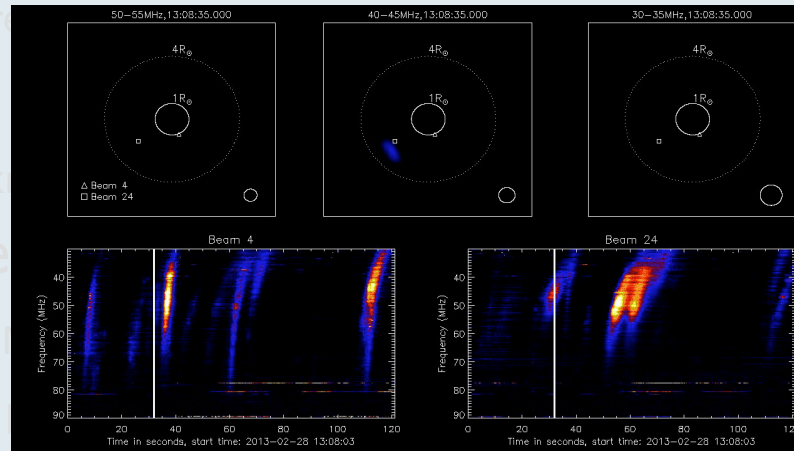
- up to 96 MHz

- ✓ spectral line

- ✓ high time resolution

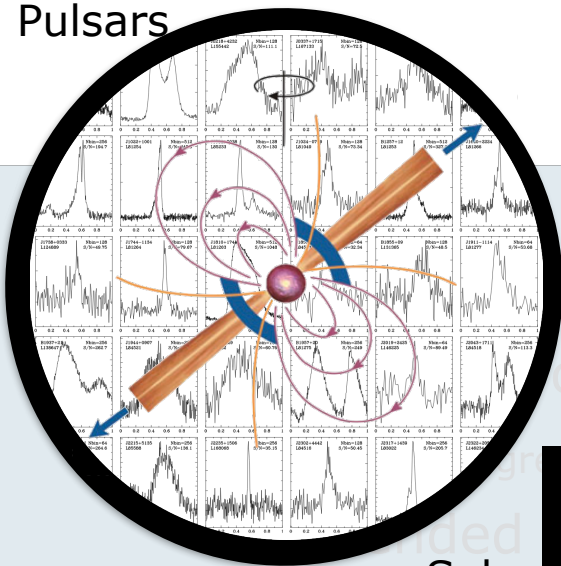
- ~ 5ms; down to 5ns

- LOFAR data is difficult to handle...but not impossible!

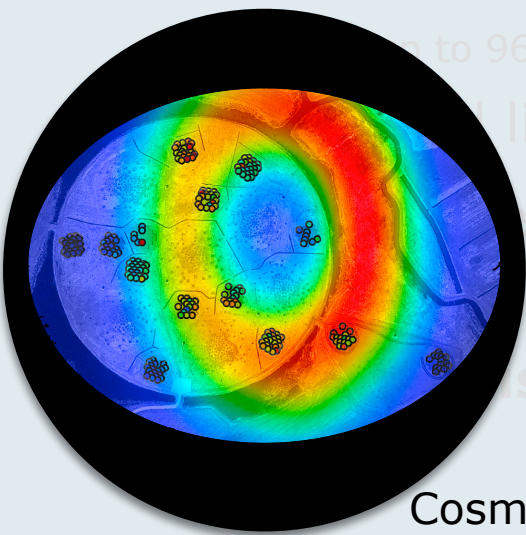


LOFAR Summary

Pulsars

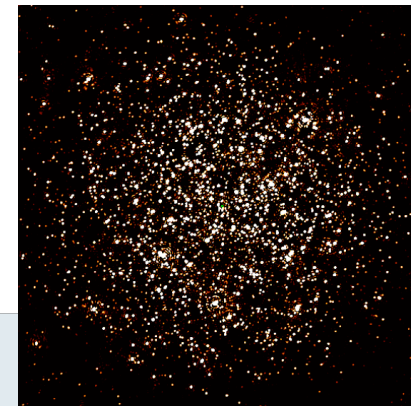
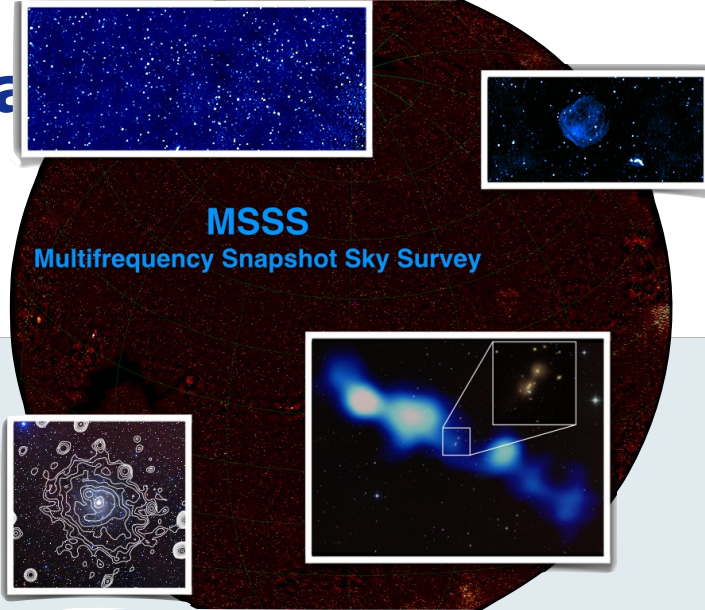


Solar

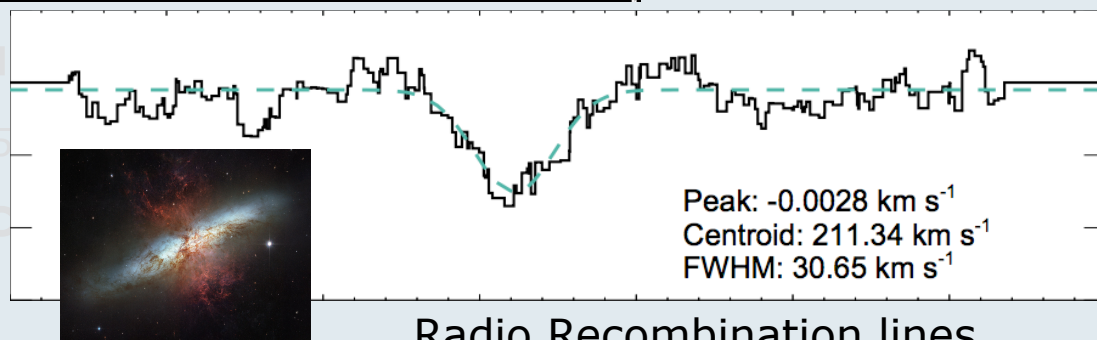
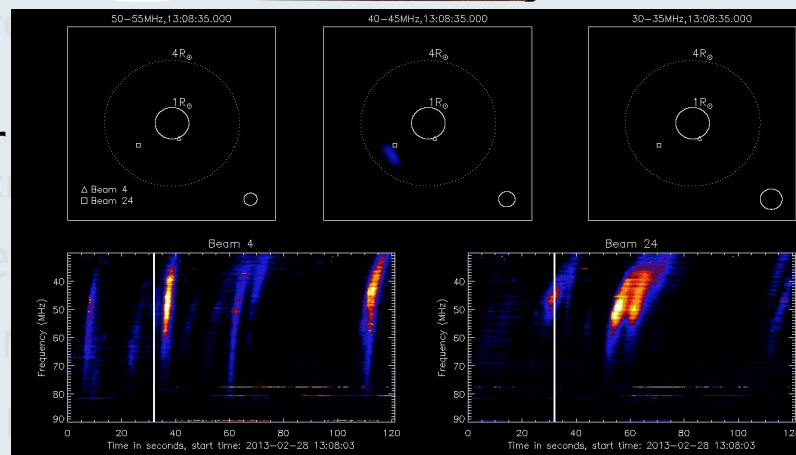
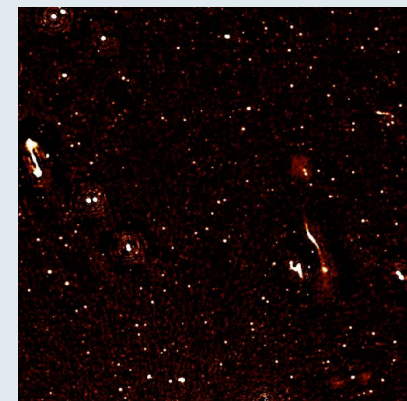


Cosmic Rays

MSSS
Multifrequency Snapshot Sky Survey



EoR



Radio Recombination lines

LOFAR proposals



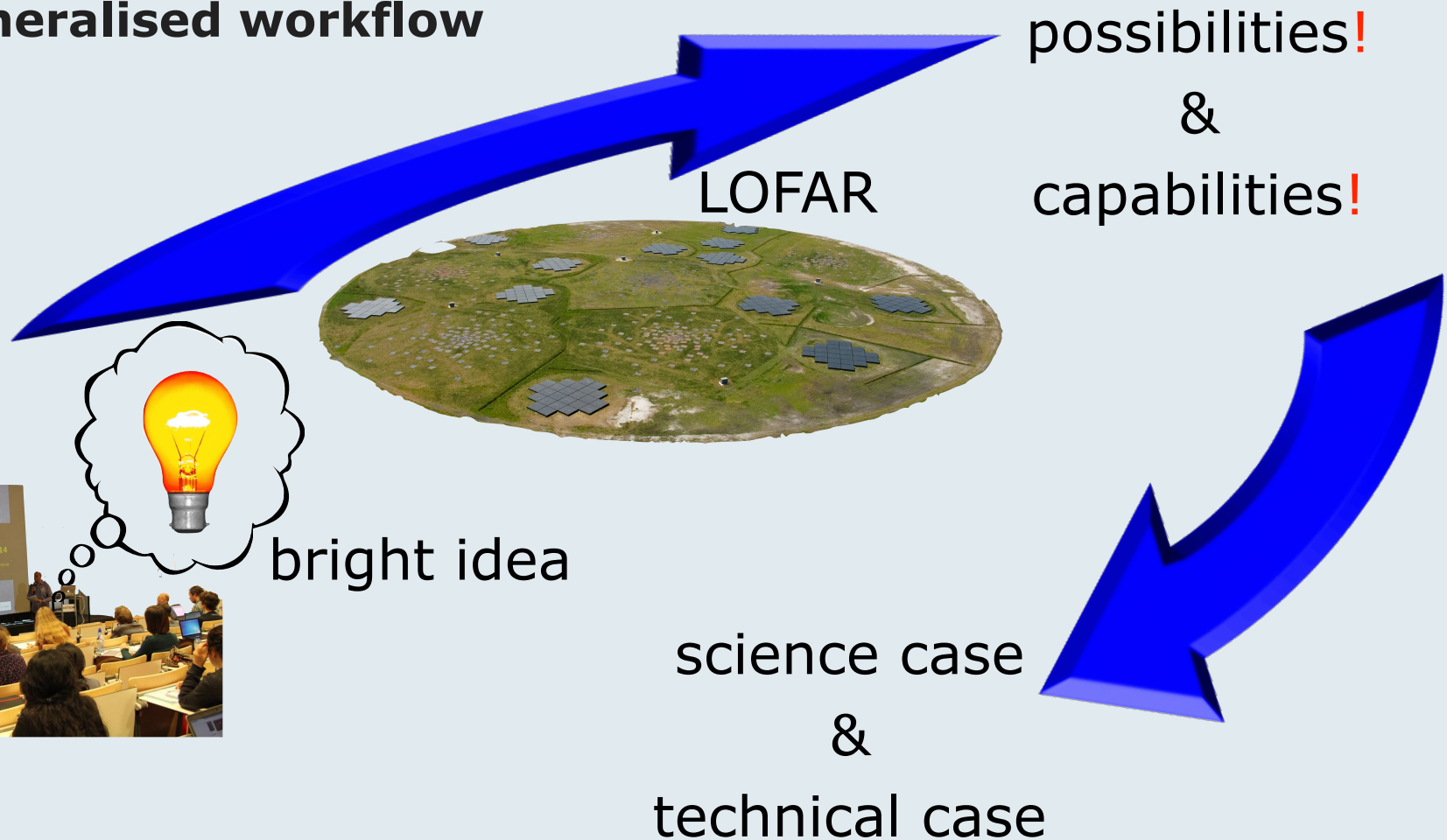
- **Generalised workflow**



LOFAR proposals



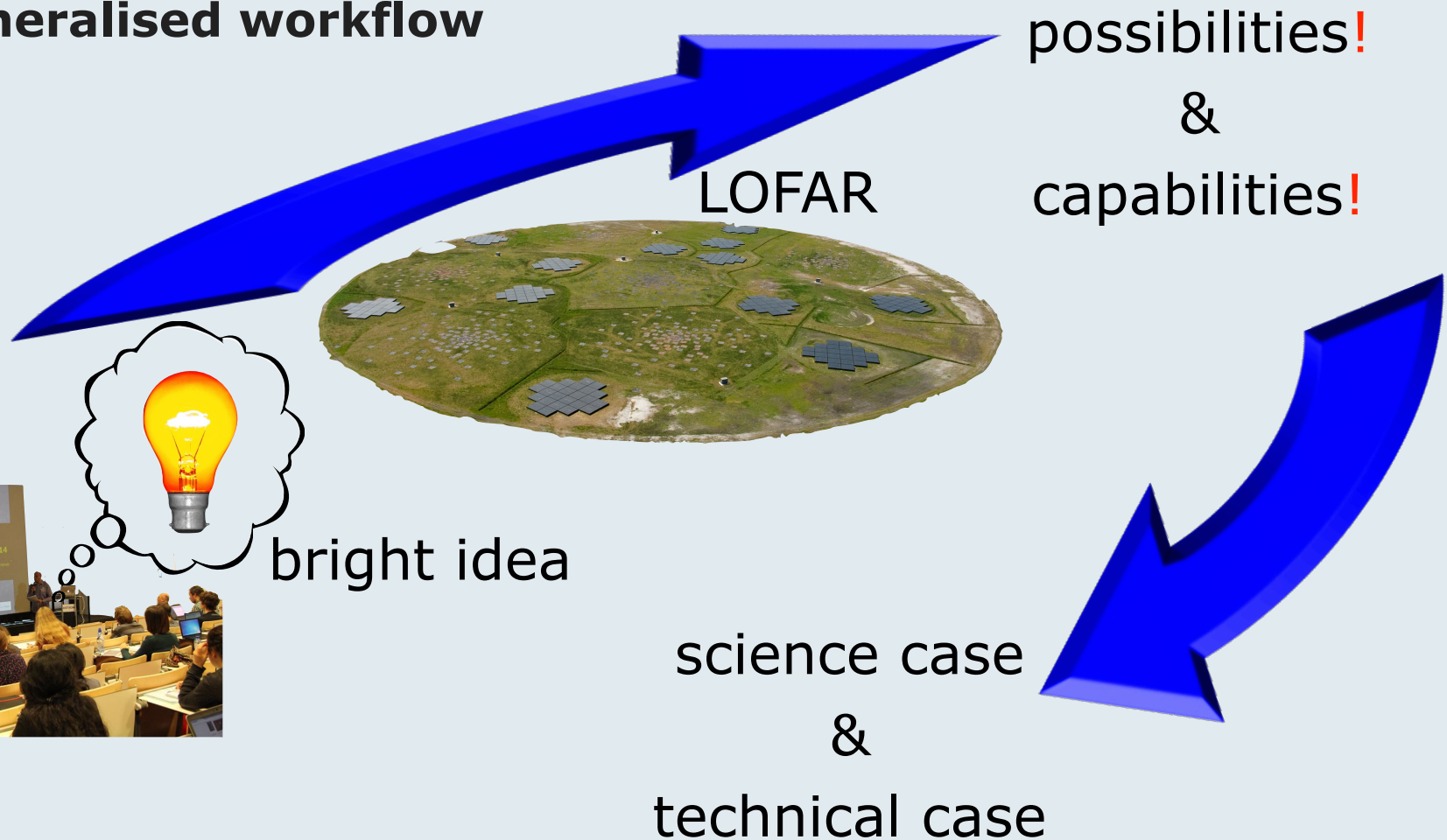
• Generalised workflow



LOFAR proposals



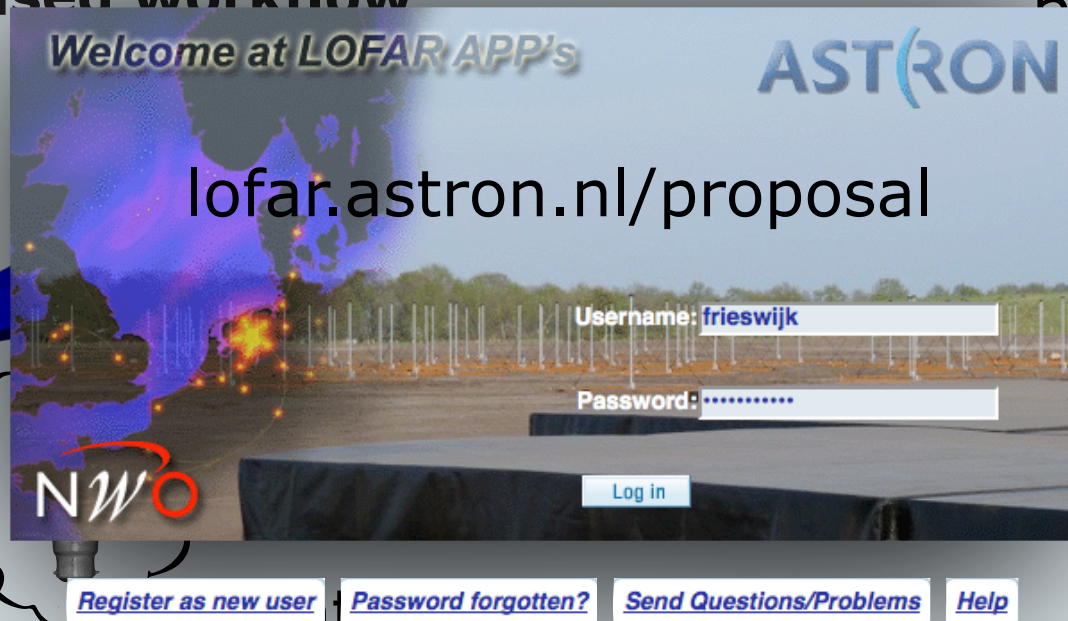
• Generalised workflow



LOFAR proposals



- Generalised workflow

A screenshot of the LOFAR APP's login page. The background shows a map of Europe with LOFAR stations marked as orange dots. The text "Welcome at LOFAR APP's" is at the top left, and the "ASTRON" logo is at the top right. The URL "lofar.astron.nl/proposal" is centered. Below it are input fields for "Username: frieswijk" and "Password: *****", followed by a "Log in" button. At the bottom are links: "Register as new user", "Password forgotten?", "Send Questions/Problems", and "Help".

Welcome at LOFAR APP's

ASTRON

lofar.astron.nl/proposal

Username: frieswijk

Password: *****

Log in

[Register as new user](#) [Password forgotten?](#) [Send Questions/Problems](#) [Help](#)

possibilities!
&
capabilities!



science case
&
technical case



Roberto's talk: Interaction user - Radio Observatory



Roberto's talk: Interaction user - Radio Observatory



Robert
Inter

CALL FOR PROPOSALS

Observing Cycles every year:
May 15 – November 14
November 15 – May 14

Proposal call: 4 months before
start of the Cycle (January/July)

<http://www.astron.nl/radio-observatory/regular-proposals/regular-proposal-instructions>

Proposal deadline: 2
months before the start of
(March, September)

Advertisement of
for the coming C

Available observ
processing hour

International LOFAR Telescope
Proposal Call to the Worldwide Community
Cycle 3: 15 November 2014 - 14 May 2015
Submission deadline Wednesday 10 September 2014, at 12 UT

This file in PDF format
the online tool NorthStar

WORKING ON PROPOSAL: MUST SEE

ASTRON

WORKING ON PROPOSAL: MUST SEE

ASTRON

strategies

WORKING ON PROPOSAL: MUST SEE

ASTRON

tools



LOFAR pages: <http://www.astron.nl/radio-observatory/radio-observatory>

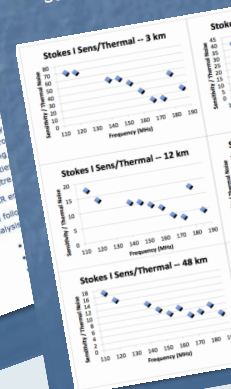


Interferometric mode web page (mode fully supported):
<http://www.astron.nl/radio-observatory/array-configurations>

Observing strategies (L

Imaging Pipeline -> se

Characterization: achi
strategies



login

- **Web-based tool**
- **Developed ~10 years ago**
- **Used by various telescopes**

✓ WSRT, LOFAR

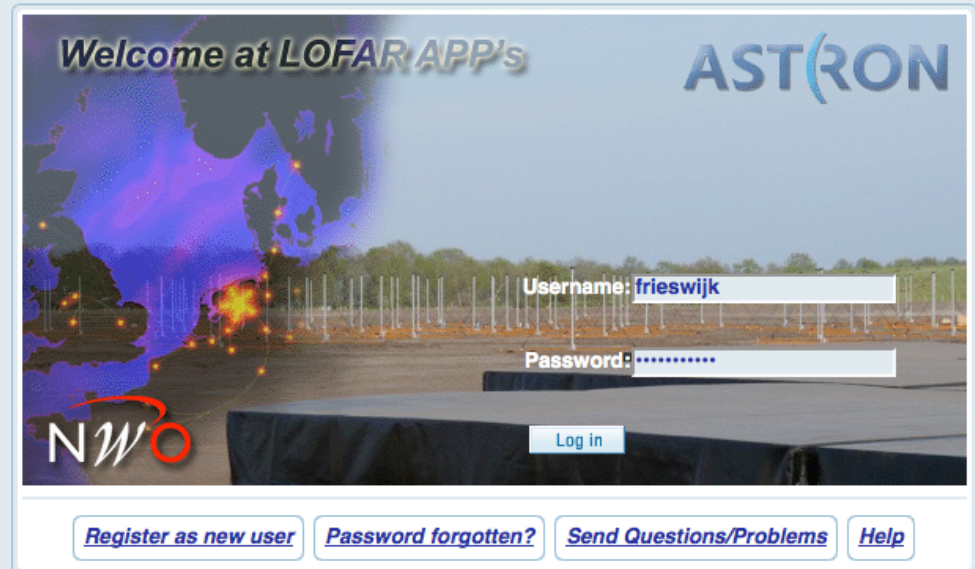
✓ EVN, JCMT, eMerlin...

- **Account**

✓ MoM, LTA

- **Walkthrough available**

lofar.astron.nl/proposal



The screenshot shows the login interface for LOFAR APP's. The header includes the text "Welcome at LOFAR APP's" and the ASTRON logo. The background features a map of Europe with a radio telescope array overlay. The login form contains fields for "Username: frieswijk" and "Password:", a "Log in" button, and links for "Register as new user", "Password forgotten?", "Send Questions/Problems", and "Help". The NWO logo is visible in the bottom left corner.

proposal list

Show reviewed proposals : ☐ Yes ☒ No

Proj_ID	PI	Title	Community	Category	Status	Options				
LOFAR telescope Proposals										
	Frieswijk	Test Jan 21 2014	LOFAR community	regular	in preparation	Edit	Copy	Delete	Submit	View
	Frieswijk	fcs	LOFAR community	regular	in preparation	Edit	Copy	Delete	Submit	View
	Frieswijk	Test 2014-01-08	LOFAR community	regular	in preparation	Edit	Copy	Delete	Submit	View
	Frieswijk		LOFAR community	regular	in preparation	Edit		Delete	Submit	View
	Oonk	Copy of LOFAR Galactic Radi...	LOFAR community	regular	in preparation	Edit				View
LRA12A001	Frieswijk	Just a test from science su...	LOFAR community	reserved_access	in preparation	Edit		Delete	Submit	View

Create new proposal

Prepare proposal

facility : **LOFAR telescope**
Community : **LOFAR community**
Choose category : **regular**
Choose period : **II**

Deadline: 27 June 2014 00:00:00 UTC

OK
Cancel

start a new proposal

Prepare proposal

facility : **LOFAR telescope**
Community : **LOFAR community**


Choose category : *




Choose period : *

 **Deadline:** 27 June 2014 00:00:00 UTC


- manual
- from previous proposal


Applicants
Justification
Observing Request
Target List
Additional Issues






 [Help](#)

	Active Participant	contact author	PI	name	affiliation	country	email	potential observer			
▼	yes	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Dr Wilfred Frieswijk	Astron	The Netherlands	frieswijk@astron.nl	<input type="checkbox"/>			
▲	no		<input type="radio"/>	Willem	ASTRON	Netherlands	frieswyk@astro.rug.nl	<input type="checkbox"/>	 invite	 Edit	 Delete

Select Proposal to import Applicant
TEST_LC1_LOFAR(2)

 Add applicant from other proposal

 Add new applicant

 Save and Continue
 Save and Preview
 Save and Exit
 Save and Submit
 Quit without saving

applicants

- manual
- from previous proposal

Applicants
Justification
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? [Help](#)

	Active Participant	contact author	PI	name	affiliation	country	email	potential observer			
▼	yes	<input checked="" type="radio"/>	<input checked="" type="radio"/>	Dr Wilfred Frieswijk	Astron	The Netherlands	frieswijk@astron.nl	<input type="checkbox"/>			
▲	no		<input type="radio"/>	Willem	ASTRON	Netherlands	frieswyk@astro.rug.nl	<input type="checkbox"/>	invite	Edit	Delete

Select Proposal to import Applicant
TEST_LC1_LOFAR(2)

Add applicant from other proposal

Add new applicant

Save and Continue
 Save and Preview
 Save and Exit
 Save and Submit
 Quit without saving

Applicants Justification Observing Request target list Additional issues

• Justification, envelope sheet

✓ note file restrictions

?

Help

Title (Max characters:150) :

Test June 24 2014

(Characters entered: 17)*

Abstract (Max words:180) :

(Words entered: 0)*

?

Justification File(s):
Instructions for preparation

Envelope sheet :

NOT_SUBMITTEDTest envelope

First Justification File : proposal_with_no_code_1.pdf (126 KB) *

Upload

uploaded2014/06/24 06:44 UTC

Upload justification file

?

Instructions for preparation

?

Help

!

Note: Only pdf files are allowed. Follow the [Instructions for preparation] to prepare the pdf and keep the number of pages within the limits of what is allowed for the specific call. If your proposal does not follow these instructions it may be rejected.

Maximum number of pages in the justification file to depend on the total requested observing time.

If Total requested observing time <= 250 hours: up to 4 pages

If Total requested observing time <= 500 hours: up to 5 pages

If Total requested observing time <= 750 hours: up to 6 pages

If Total requested observing time <= 1000 hours: up to 7 pages

If Total requested observing time > 1000 hours: up to 8 pages

Upload Scientific Justification File :

Choose File

No file chosen

Upload

Cancel

Applicants Justification Observing Request target list Additional issues

• Justification, envelope sheet

✓ note file restrictions

[? Help](#)

Title (Max characters:150) : (Characters entered: 17) *

Abstract (Max words:180) : (Words entered: 0) *

[? Justification File\(s\):](#)
[Instructions for preparation](#)


Envelope sheet :

First Justification File : [proposal_with_no_code_1.pdf](#) (126 KB) *

uploaded2014/06/24 06:44 UTC

Upload justification file

[? Instructions for preparation](#) [? Help](#)

 Note: Only pdf files are allowed. Follow the [Instructions for preparation] to prepare the pdf and keep the number of pages within the limits of what is allowed for the specific call. If your proposal does not follow these instructions it may be rejected.

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 If Total requested observing time <= 750 hours: up to 6 pages
 If Total requested observing time <= 1000 hours: up to 7 pages
 If Total requested observing time > 1000 hours: up to 8 pages

Upload Scientific Justification File : No file chosen

Applicants Justification Observing Request target list Additional issues

• Technical justification

Is nighttime required ☐ Yes ☒ No

Are there parallel observations planned with other observing facilities? ☐ Yes ☒ No

Do you request using International stations? ☐ Yes ☒ No

Are there other scheduling constraints? ☐ Yes ☒ No

What is your sensitivity requirement? (mJy)





What is the expected maximum data rate? (GB/s)

Do you request any processing offered by the RO? ☐ Yes ☒ No

Are you requesting storage in the LTA for raw data products? ☐ Yes ☒ No

Do you require off-line data processing on RO facilities (CEP3)? ☐ Yes ☒ No

Do you have access to external processing facilities? ☐ Yes ☒ No

 Save and Continue  Save and Preview  Save and Exit  Save and Submit

Is nighttime required? ☒ Yes ☐ No
Elaborate (Max words:60) :

nighttime requirement

(Words entered: 0) *

Are there parallel observations planned with other observing facilities? ☒ Yes ☐ No
Elaborate

parallel observations

(Words entered: 0) *

Do you request using International stations? ☒ Yes ☐ No
Are they essential/critical for the observations? ☒ Yes ☐ No
Elaborate

international stations

(Words entered: 0) *

Are there other scheduling constraints? ☒ Yes ☐ No
Elaborate

Explain why the International stations are essential for the science proposed.

other constraints

(Words entered: 0) *

What is your sensitivity requirement? (mJy)

What is the expected maximum data rate? (GB/s)

sensitivity & data rate

Do you request any processing offered by the RO? ☒ Yes ☐ No
Do you request the "default" imaging pipeline offered by the RO? ☐ Yes ☒ No
Are you requesting storage in the LTA for raw data products? ☒ Yes ☐ No
Elaborate

RO pipelines/imaging

raw data to LTA

(Words entered: 0) *

Do you require off-line data processing on RO facilities (CEP3)? ☒ Yes ☐ No
Elaborate

off-line processing (CEP3)

(Words entered: 0) *

Do you have access to external processing facilities? ☒ Yes ☐ No
Elaborate




external processing

(Words entered: 0) *

instrument specifications

Applicants Justification Observing Request target list Additional issues

• 2 step process

Id	Targets	Runs	Telescope	Mode	Exposure (Hours)	BF Data (TB)	Store Raw Data	UV Data (TB)	Store UV Data	TBB Data (TB)	Total LTA Storage (TB)	
A	0 targets	0 runs	LOFAR		0	0.0	NO	0.0	NO	0.0	0.0	 Edit  Copy  Delete

 Specify a new observation

step 1a

Id	Targets	Telescope	Mode	av time	av freq	demixing	Total LTA Storage (TB)	P/O Ratio	Total Processing Time (Hours)	
A	0 targets	LOFAR	Pre processing only			N	0.00			 Edit  Copy  Delete

 Specify a new Pipeline :

step 1b


Telescope configuration :

Telescope : LOFAR

Choose an observing mode :

- ☐ Interfero Mode Settings
- ☐ BeamFormed Mode Settings
- ☐ TBB Mode Settings
- ☐ TBB (PiggyBack) Mode Settings
- ☐ Other Settings

step 1a




 Commit Observation specification


 Save and Continue
  Save and Preview
  Save and Exit
  Save and Submit
  Quit without save

instrument specifications




Applicants Justification Observing Request target list Additional issues


• 2 step process

Id	Targets	Runs	Telescope	Mode	Exposure (Hours)	BF Data (TB)	Store Raw Data	UV Data (TB)	Store UV Data	TBB Data (TB)	Total LTA Storage (TB)	
A	0 targets	0 runs	LOFAR		0	0.0	NO	0.0	NO	0.0	0.0	 Edit  Copy  Delete

 Specify a new observation

step 1a

Id	Targets	Telescope	Mode	av time	av freq	demixing	Total LTA Storage (TB)	P/O Ratio	Total Processing Time (Hours)	
A	0 targets	LOFAR	Pre processing only			N	0.00			 Edit  Copy  Delete

 Specify a new Pipeline :

step 1b

Telescope configuration :






Telescope : LOFAR

Choose an observing mode :

- ☐ Interfero Mode Settings
- ☐ BeamFormed Mode Settings
- ☐ TBB Mode Settings
- ☐ TBB (PiggyBack) Mode Settings
- ☐ Other Settings

step 1a

 Commit Observation specification

 Save and Continue
  Save and Preview
  Save and Exit
  Save and Submit
  Quit without save

NORTH

instrum

Telescope configuration :

Telescope : LOFAR

Choose an observing mode : ☒ Interfero Mode Settings
☒ BeamFormed Mode Settings
☒ TBB Mode Settings
☐ TBB (PiggyBack) Mode Settings
☒ Other Settings

Common Settings

Choose stations : **Core (24)** *
Choose clock : **200 MHz** *
Choose antenna : **HBA Dual (48)** *
Choose filter : **110-190 MHz** *

BeamFormed Mode Settings

Coherent stokes : ☒ Yes ☐ No
Incoherent stokes : ☐ Yes ☒ No
Fly's eye : ☐ Yes ☒ No
Raw voltage : ☒ Yes ☐ No
Polarizations (CS/FE) : **1**
Coherent tied array beams : **1** *
Coherent Channels per subband : ☐ 1 ☐ 16 ☐ 32 ☒ 64 ☐ 128 ☐ 256 ☐ 512 *
Coherent Stokes integration steps : **128** *
tied array rings : **3**
Keep raw observation data : ☒ Yes ☐ No

Interfero Mode Settings

Integration time: (seconds) : **1** *
Keep correlated visibilities data : ☒ Yes ☐ No
Required noise level (Jy) : **1**

TBB Mode Settings

Trigger Length (sec) : **0.0010** *
Trigger Length must be between 0.001 to 5 sec
Trigger Rate (per hour) : **1** *
Trigger Source : **LORA particle detector**

Other Settings

Configuration comments : **Any comments you may have...** *

 **Commit Observation specification**




step 1a

LOFAR
STRON

instrument specifications

Applicants Justification Observing Request target list Additional issues

• 2 step process

Id	Targets	Runs	Telescope	Mode	Exposure (Hours)	BF Data (TB)	Store Raw Data	UV Data (TB)	Store UV Data	TBB Data (TB)	Total LTA Storage (TB)	
A	0 targets	0 runs	LOFAR		0	0.0	NO	0.0	NO	0.0	0.0	 Edit  Copy  Delete

 Specify a new observation

step 1a

Id	Targets	Telescope	Mode	av time	av freq	demixing	Total LTA Storage (TB)	P/O Ratio	Total Processing Time (Hours)	
A	0 targets	LOFAR	Pre processing only			N	0.00			 Edit  Copy  Delete

 Specify a new Pipeline :

step 1b


Telescope configuration :

Telescope : LOFAR

Choose an observing mode :

- ☐ Interfero Mode Settings
- ☐ BeamFormed Mode Settings
- ☐ TBB Mode Settings
- ☐ TBB (PiggyBack) Mode Settings
- ☐ Other Settings

step 1a

 Commit Observation specification

 Save and Continue
  Save and Preview
  Save and Exit
  Save and Submit
  Quit without save

instrument specifications

• 2 step

Applicants

Justification

Id	Targets	Runs	Telescope
A	0 targets	0 runs	LOFAR

Id	Targets	Telescope
A	0 targets	LOFAR

Pre processing parameters

Processing mode: Pre processing only *

Flagging strategy: LBA *

Averaging time steps: 5 [steps] *

Averaging freq. steps: 16 [steps] *

Demixing ? ☒ Yes ☐ No

Demixing time steps: 10 [steps] *

Demixing freq. steps: 64 [steps] *

Demixing sources :

☒ CygA
 ☒ CasA
 ☐ TauA
 ☐ VirA
 ☐ HerA
 ☐ HydA

Configuration comments :

Calibration

Calibration + imaging

Imaging parameters

No imaging selected in processing mode

Subbands per image: [int] *

Field of view: [deg] *

Commit Pipeline

step 1b

Pipeline configuration

Pre processing parameters

Processing mode: **Pulsar pipeline** *

Configuration comments :



Commit Pipeline



Save and Continue



Save and Preview



Save and Exit



Save and Submit



Quit without save

Id Targets Telesc

Demixing sources :



CygA



Delete

Pipeline configuration

Pre processing parameters

Processing mode: **Long baseline calibration** *

Flagging strategy : **LBA** *

Averaging time steps: **5** [steps] *

Averaging freq. steps: **16** [steps] *

Configuration comments :



Commit Pipeline



Save and Continue



Save and Preview



Save and Exit



Save and Submit



Quit without save

target specifications

Applicants Justification Observing Request **target list** Additional issues

• manual or upload list

New Target :

Calibration beam? : ☐ Yes ☒ No

Field name : [Get RA & Dec from Simbad](#) NB: proposers should check coordinates

RightAscension : hh:mm:ss.ss *

Declination : [+|-]dd:mm:ss.s *

Epoch : J2000

Flux density (Jy) : Reference frequency (MHz) :

Spectral index α ($S(\nu) \propto \nu^{-\alpha}$) :

Subband list : *

NB: Put Frequency and Bandwidth and get SubbandList calculated, Otherwise put SubbandList manually. For Example: 2-315,15-115 etc. The maximum number of subbands per run is 488

Central frequency : Bandwidth :

Run# : 1

Exposure time in minutes : *

Select observation :

Select processing pipeline :

Comments :

couple to observation/pipeline setup

step 2

target specifications

Applicants Justification Observing Request **target list** Additional issues

• manual or upload list

targets :

Run#	Field	RA	Dec	Epoch	Time(Hours)	Subbands	Calibr.	Obs.	Pipe.	Comments						
1	3C196	08:13:36.07	+48:13:02.6	J2000	100	12..499		A	A	split in 10-12hr blocks		Edit		Copy		Delete
2	3C196	14:11:20.60	+52:12:09.0	J2000	0.17	55..420		B	B	flux cal		Edit		Copy		Delete
3	DF001	17:10:00.00	+60:50:00.0	J2000	6	55..420		B	C	target beam		Edit		Copy		Delete
	3C343	16:34:33.81	+62:45:36.0	J2000		55..77,401..420		B	B	cal beam		Edit		Copy		Delete
4	3C48	01:37:41.30	+33:09:35.1	J2000	0.17	55..420		B	B	flux cal		Edit		Copy		Delete
5	3C147	05:42:36.26	+49:51:07.1	J2000	1	52..467	Y	C	D	Calibrator Run#5-6		Edit		Copy		Delete
6	DC156	05:32:32.00	+52:50:00.1	J2000	6	52..467		C	E	Target Run#5-6		Edit		Copy		Delete
7	Fr479	06:03:00.00	+52:00:00.0	J2000	14	156..316		D	F	Target beam		Edit		Copy		Delete
	Fr480	07:08:00.00	+44:00:00.0	J2000		156..316		D	F	Target beam		Edit		Copy		Delete
	3C196	08:13:36.07	+48:13:02.6	J2000		156..316	Y	D	F	Calibrator beam		Edit		Copy		Delete
8	P0123	01:02:03.00	+82:00:00.0	J2000	1	256..300		E	G	Beamformed		Edit		Copy		Delete
9	empty	00:00:00.00	+00:00:00.0	J2000	1,500	55		F	H	TBB piggyback		Edit		Copy		Delete

New Target :

Calibration beam? : ☐ Yes ☒ No

Field name : **Get RA & Dec from Simbad** NB: proposers should check coordinates

RightAscension : hh:mm[:ss.ss]

Declination : [+|-]dd:mm[:ss.s]

Epoch : J2000

Flux density (Jy) : Reference frequency (MHz) :






















Spectral index α ($S(\nu) \propto \nu^{-\alpha}$) :


step 2






















setup completed

Applicants Justification Observing Request **Target List** Additional issues

[? Help](#)

Id	Targets	Runs	Telescope	Mode	Exposure (Hours)	BF Data (TB)	Store Raw Data	UV Data (TB)	Store UV Data	TBB Data (TB)	Total LTA Storage (TB)						
A	1 targets	1 runs	LOFAR	Interferometer	100	0.0	NO	195.2	YES	0.0	195.2		Edit		Copy		Delete
B	3 targets	2 runs	LOFAR	Interferometer	6.17	0.0	NO	42.71	YES	0.0	42.71		Edit		Copy		Delete
C	2 targets	2 runs	LOFAR	Interferometer	7	0.0	NO	34.31	YES	0.0	34.31		Edit		Copy		Delete
D	3 targets	1 runs	LOFAR	Beam Observation-Interferometer	14	0.37	YES	4.83	YES	0.0	5.19		Edit		Copy		Delete
E	1 targets	1 runs	LOFAR	Beam Observation	1	0.04	YES	0.0	NO	0.0	0.04		Edit		Copy		Delete
F	0 targets	0 runs	LOFAR	Interferometer-TBB	0	0.0	NO	0.0	YES	0.0	0.0		Edit		Copy		Delete
G	0 targets	0 runs	LOFAR	TBBPIGGYBACK	0.28	0.0	NO	0.0	NO	6.13	6.13		Edit		Copy		Delete

 Specify a new observation

Id													Targets	Telescope	Mode	av time	av freq	demixing	Total LTA Storage (TB)	P/O Ratio	Total Processing Time (Hours)			
A	1 targets	LOFAR	Pre processing only	1.0	1.0	Y(CygA,CasA)	253.76	3(1)	300		Edit		Copy		Delete									
B	2 targets	LOFAR	Pre processing only	10.0	64.0	N	0.18	0.5(1) 1.5(1)	3.25		Edit		Copy		Delete									
C	1 targets	LOFAR	Pre processing only	5.0	16.0	N	1.08	1.5(1)	9		Edit		Copy		Delete									
D	1 targets	LOFAR	Calibration	10.0	64.0	N	0.07	1.5(1)	1.5		Edit		Copy		Delete									
E	1 targets	LOFAR	Calibration + imaging	10.0	64.0	N	0.07	c:1.5i:0.9(1)	14.4		Edit		Copy		Delete									
F	3 targets	LOFAR	Calibration	10.0	64.0	Y(CygA,CasA)	0.04	2(3)	28		Edit		Copy		Delete									
G	1 targets	LOFAR	Pulsar pipeline			N	0.00	0.2(1)	0.2		Edit		Copy		Delete									

 Specify a new Pipeline :

setup completed

Applicants

Justification

Observing Request

Target List

Additional issues

?

Help

Id	Targets	Runs	Telescope
A	1 targets	1 runs	LOFAR
B	3 targets	2 runs	LOFAR
C	2 targets	2 runs	LOFAR
D	3 targets	1 runs	LOFAR
E	1 targets	1 runs	LOFAR
F	0 targets	0 runs	LOFAR
G	0 targets	0 runs	LOFAR

LOFAR

Time specified for targets (in hours):

Total 0

Hours requested this period (incl. cal. and o/heads) :

Total *

Minimum useful time (hours):

Total *

Minimum useful time must be less than or equal to requested hour.

Processing time specified: 0.0 (Hours)

Processing time requested in hours (on CEP2):

Total *

Storage specified: 0.00 TB

Long term LTA storage requested in terabytes (10¹² bytes):

Total *

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calculated

additional information

Applicants Justification Observing Request Target List Additional Issues

●final step

Information about all Students involved



add new student

Publications and relevant proposals

Add publications (Max 8) :
place each entry on a new line,
the following information has to be provided:
Publication - Authors, Title, Journal Reference
Proposals ? Instrument, cycle/code, status
(e.g., time awarded/completed/in progress)

mandatory field: publication/previous proposals

Additional Remarks :

NORTHSTAR

that's all there is to it



ASTRON

that's all there is to it

• **do not forget, next call for proposals ~ January 2015**

- ✓ start early, read documentation
- ✓ think ahead (know what you want/need)
- ✓ be concise, to the point

THANK YOU