

## ***REPORT ON THE RADIONET3 NETWORKING ACTIVITY***

**TITLE: THE 2<sup>ND</sup> LOFAR USERS MEETING AND THE 2015 LOFAR COMMUNITY SCIENCE WORKSHOP**

**DATE: 1-3 JUNE 2015**

**TIME: (WHOLE DAY)**

**LOCATION:** *ASSEN, THE NETHERLANDS*

**MEETING WEBPAGE** <http://www.astron.nl/lofarscience2015/>

**HOST INSTITUTE:** *ASTRON*

**PARTICIPANTS NO:** *90*

**MAIN LEADER:** *ASTRON*

## REPORT:

### 1. Programme of the meeting

#### Agenda 2<sup>nd</sup> LOFAR Users Meeting

<b>Monday, 1 June 2015</b>		
13:00 - 13:30	<b>Registration, coffee/tea</b>	
<b>Radio Observatory contributions</b>		
13:30 - 14:00	R. F. Pizzo	<i>LOFAR Observatory Overview and feedback from 1st LOFAR Users Meeting</i>
14:00 - 14:15	T. J. Dijkema	<i>The Calibration and Imaging Tiger Team</i>
14:15 - 14:30	H. Holties	<i>LOFAR Development Roadmap</i>
14:30 - 14:45	M. Brentjens	<i>The LOFAR Technical Working Group</i>
<b>KSP's experience contributions</b>		
14:45 - 15:00	A. G. de Bruyn + V. Pandey	<i>EoR KSP</i>
15:00 - 15:15	T. Shimwell	<i>Surveys KSP</i>
15:15 - 15:30	Y. Cendes + J. Hessels	<i>Transients KSP</i>
15:30 - 16:00	<b>Coffee Break</b>	
<b>KSP's experience contributions (cont.)</b>		
16:00 - 16:15	D. Jones	<i>Magnetism KSP</i>
16:15 - 16:30	G. Mann	<i>Solar KSP</i>
16:30 - 16:45	J. Rachen	<i>Cosmic Rays KSP</i>
16:45 - 17:00	J. Hessels	<i>LOFAR 2.0 - a diverse list of options</i>
17:00 - 18:00	<b>Discussion LOFAR 2.0</b>	
18:00 - 19:30	<b>Welcoming reception</b>	

## Agenda 2015 LOFAR Community Science Workshop

Tuesday June 2

TimeSlot	Name	Title
08:30	<b>Registration</b>	
09:00	<b>Opening</b>	Welcome to LOFAR Science 2015
09:10	<b>1. Beam formed transients</b>	<i>Chair: Joeri van Leeuwen</i>
09:10	Sally Cooper	An update on the LOTAAS Survey for Pulsars and Transients
09:30	Anna Bilous	LOFAR Census of Non-Millisecond Pulsars
09:50	Jason Hessels	C'est la mode: characterizing pulsar B0943+10's radio/X-ray mode-switching behavior
10:10	Charlotte Sobey	High-precision Faraday rotation measures from LOFAR observations of pulsars
10:30	<b>Coffee</b>	
11:00	Sander ter Veen	Searching for pulsars in globular clusters
11:20	Yogesh Maan	Discovery of fast radio transients at very low frequencies
11:40	<b>2. Image plane transients</b>	<i>Chair: Alexander van der Horst</i>
11:40	Dario Carbone	The LOFAR Transients Key Science Project: status and updates on image plane transients
12:00	Emilio Enriquez	First observations of brown dwarfs with LOFAR
12:20	Prasad Peeyush	Imaging for transient detection with AARTFAAC
12:40	<b>Lunch</b>	
14:00	<b>3. Solar</b>	<i>Chair: Emanuela Orru</i>
14:00	Gottfried Mann	LOFAR observations of energetic electrons in the Sun's atmosphere
14:20	Diana Morosan	LOFAR Imaging and Spectroscopy of Short-lived Solar Radio Bursts
14:40	Hamish Reid	Accelerated Electrons and Solar Radio Bursts
15:00	Frank Beitzing	Recent developments of the Solar Imaging Pipeline
15:20	Richard Fallows	Recent Musings on Ionospheric Scintillation, featuring the Quest for Phase
15:40	<b>Coffee</b>	
16:10	<b>4. Cosmic rays</b>	<i>Chair: David Jones</i>
16:10	Jorg Horandel	Measurement of the particle type of cosmic rays with LOFAR
16:30	Laura Rossetto	Study of the cosmic ray radio emission pattern at the ground level with LOFAR
16:50	Arthur Corstanje	Radio wavefront of extensive air showers from pulse arrival timing at LOFAR
17:10	Satyendra Thoudam	The cosmic-ray energy spectrum above $\sim 10^{16}$ eV measured with the LRA Array
17:30	Olaf Scholten	Probing atmospheric electric fields in thunderstorms
17:50	<b>End of Day</b>	

Wednesday June 3

09:00	<b>5. Imaging and calibration</b>	<i>Chair: Matthias Hoeft</i>
09:00	Sarod Yatawatta	Consensus optimization: The (only) way forward
09:20	Maaijke Mevius	Probing Ionospheric Structure Using LOFAR EOR Data
09:40	Bas van der Tol	Simultaneous measurement of ionospheric parameters using LOFAR and GNSS satellite receivers
10:00	Cyril Tasse	Wintering-based calibration and imaging for the extragalactic surveys
10:20	Francesco de Gasperin	Imaging with the LOFAR Low Band Antenna
10:40	<b>Coffee</b>	
11:00	<b>6. Continuum Sources</b>	<i>Chair: Elizabeth Mahony</i>
11:00	Tim Shimwell	LOFAR surveys of the low frequency sky
11:20	Raffaella Morganti	Searching for remnants of radio AGN with LOFAR
11:40	Aleksander Shulevski	A low frequency look of two giant radio galaxies
12:00	Marisa Brienza	The fate of radio galaxies: a LOFAR perspective
12:20	Alexander Drabant	Investigating diffuse radio emission with LOFAR: The complex merging galaxy cluster Abell 2069
12:40	<b>Lunch</b>	
13:50	<b>7. Continuum Sources</b>	<i>Chair: Marijke Harverkom</i>
13:50	Alex Clarke	A1682: An Ultra Steep Spectrum Radio Halo
14:10	Sarvesh Sridhar	Low frequency observation of the Pinwheel galaxy (M101)
14:30	Cameron Van Eck	Faraday Tomography with LOFAR
14:50	Vibor Jelic	LOFAR observations of ISM at high Galactic latitudes
15:10	Glenn White	Galactic radio emission
15:30	<b>Coffee</b>	
15:50	<b>8. Spectral line and long baselines</b>	<i>Chair: John McKean</i>
15:50	Ger de Bruyn	EoR update and sub-arcsecond imaging of 3C196
16:10	Adam Deller	LOBOS: The Long Baseline Calibrator Survey
16:30	Javier Moldon	High-resolution wideband observations of 4C19.44 with International LOFAR
16:50	Leah Morabito	Spatially Resolved Studies of High Redshift Radio Galaxies with LOFAR
17:10	Pedro Salas	The Cold Neutral Medium through Carbon Radio Recombination Lines
17:30	<b>Summary</b>	Heino Falcke
17:55	<b>Closing remarks</b>	LOC
18:00	<b>End of Science Meeting</b>	

## Speakers:

FirstName	Last Name	Institute	Country
Anna	Bilous	Radboud University	Netherlands
Frank	Breitling	Leibniz-Institut fuer Astrophysik Potsdam (AIP)	Germany
Michiel	Brentjens	ASTRON	Netherlands
Marisa	Brienza	ASTRON	Netherlands
Dario	Carbone	Anton Pannekoek Institute	Netherlands
Yvette	Cendes	Anton Pannekoek Institute	Netherlands
Alex	Clarke	University of Manchester	United Kingdom
Sally	Cooper	Uni of Manchester	United Kingdom
Arthur	Corstanje	Radboud University Nijmegen	Netherlands
Ger	de Bruyn	ASTRON	Netherlands
Francesco	de Gasperin	University of Hamburg	Germany
Adam	Deller	ASTRON	Netherlands
Tammo Jan	Dijkema	ASTRON	Netherlands
Alexander	Drabent	TLS Tautenburg	Germany
J. Emilio	Enriquez	Radboud University Nijmegen	Netherlands
Heino	Falcke	Radboud University Nijmegen	Netherlands
Richard	Fallows	ASTRON	Netherlands
Jorg	Horandel	Radboud University Nijmegen	Netherlands
Jason	Hessels	ASTRON/UvA	Netherlands
Vibor	Jelic	University of Groningen & ASTRON	Netherlands
David	Jones	Radboud University Nijmegen	Netherlands
Yogesh	Maan	National Centre for Radio Astrophysics (NCRA)	India
Gottfried	Mann	Leibniz-Institut fuer Astrophysik Potsdam (AIP)	Germany
Maaijke	Mevius	Astron	Netherlands
Javier	Moldon	ASTRON	Netherlands
Leah	Morabito	Leiden Observatory	Netherlands
Raffaella	Morganti	ASTRON/Kapteyn Groningen	Netherlands
Diana	Morosan	Trinity College Dublin	Ireland
Raymond	Oonk	ASTRON / Leiden Observatory	Netherlands
Vishambhar	Pandey	ASTRON/RUG	Netherlands
Peeyush	Prasad	ASTRON	Netherlands
Hamish	Reid	University of Glasgow	United Kingdom
Laura	Rossetto	Radboud University Nijmegen	Netherlands
Olaf	Scholten	Univ. of Groningen / KVI-CART	Netherlands
Timothy	Shimwell	Leiden University	Netherlands
Aleksandar	Shulevski	ASTRON	Netherlands
Charlotte	Sobey	ASTRON	Netherlands
Sarvesh	Sridhar	Kapteyn Institute, RuG	Netherlands
Cyril	TASSE	CNRS - Observatoire de Paris	France
Sander	ter Veen	ASTRON	Netherlands
Satyendra	Thoudam	Radboud University	Netherlands
Sebastiaan	van der Tol	Astron	Netherlands
Cameron	Van Eck	Radboud University	Netherlands
Glenn	White	Open University and Rutherford Appleton Laboratory	United Kingdom
Sarod	Yatawatta	ASTRON	Netherlands

## 2. Scientific Summary

The 2nd LOFAR Users Meeting and the 2015 LOFAR Community Science Collaboration Workshop took place in Assen on June 1-3, 2015. The meetings brought together 90 members of the LOFAR science community.

The **Users Meeting** - held on Monday afternoon, June 1- was open to the whole LOFAR community and provided a forum for users to both learn about the status of the array as well as give feedback. Members of the Radio Observatory gave updates on the current operational status, ongoing developments, and plans for the coming year. Among the important enhancements introduced in the system, the addition of new international stations to the array, the introduction of new software pipelines into the operational system, and new techniques to improve the quality of LOFAR images were overviewed. Representative users from the community were also invited to share their personal experiences from using the system.



The Radio Observatory answered questions and gathered a lot of good feedback that will be used to improve the user experience. The final session of the meeting was dedicated to discussing options for improvements / extensions / upgrades to LOFAR in the coming years.

The Users Meeting was followed on Tuesday by a two day **LOFAR Community Science Workshop** where members of the LOFAR collaboration presented their latest science results and shared ideas and experiences about doing science with LOFAR. The science workshop program covered the gamut of the LOFAR science case from cosmology and extragalactic research to Galactic and solar system topics. An amazing range of results were presented including new record-breaking sub-arc imaging with LOFARs international baselines (Fig. 1), the low-band image of Virgo A (Fig. 2), the most precise and probably most accurate Cosmic Rays composition measurements, and the large scale Galactic emission in both total intensity (Fig. 3) and polarization. All these achievements clearly show that LOFAR remains a growing and scientifically exciting instrument with an active scientific user community. The science workshop picture is shown in Fig.4.

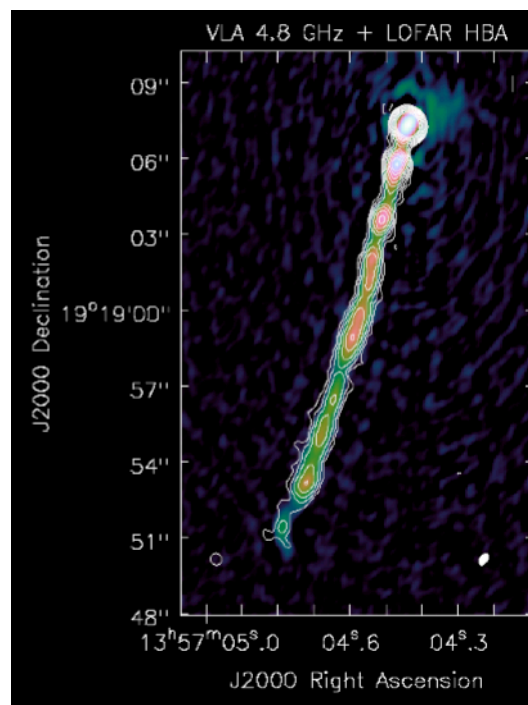


Figure 1: Overlay of LOFAR HBA (colors) and 1.4 GHz VLA (contours) images of 4C19.44. The resolution of the LOFAR image is 0.5" x 0.3" and the noise is 85 microJy/beam. Credits: J. Moldon (ASTRON).

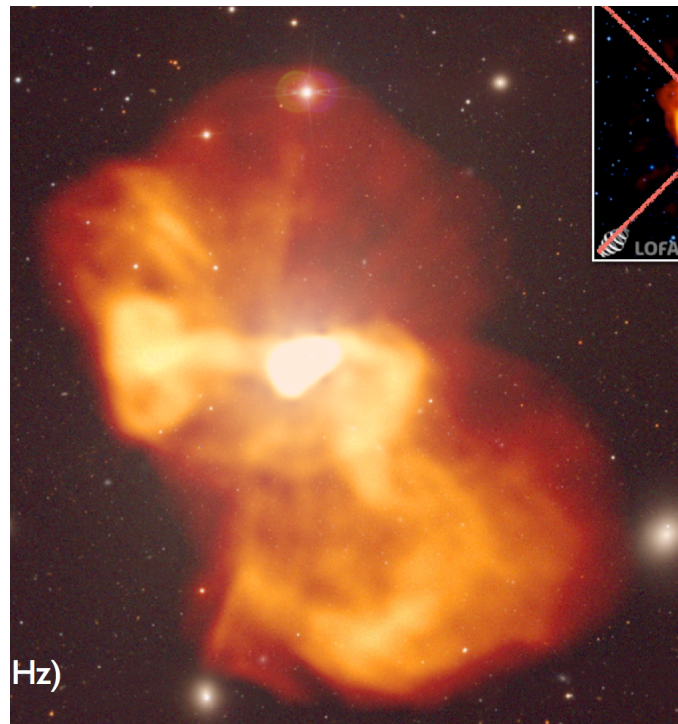


Figure 2: LOFAR LBA image of Virgo A. The noise is 30 mJy/beam; the resolution is 16' x 17". Credits: F. de Gasperin (University of Hamburg).

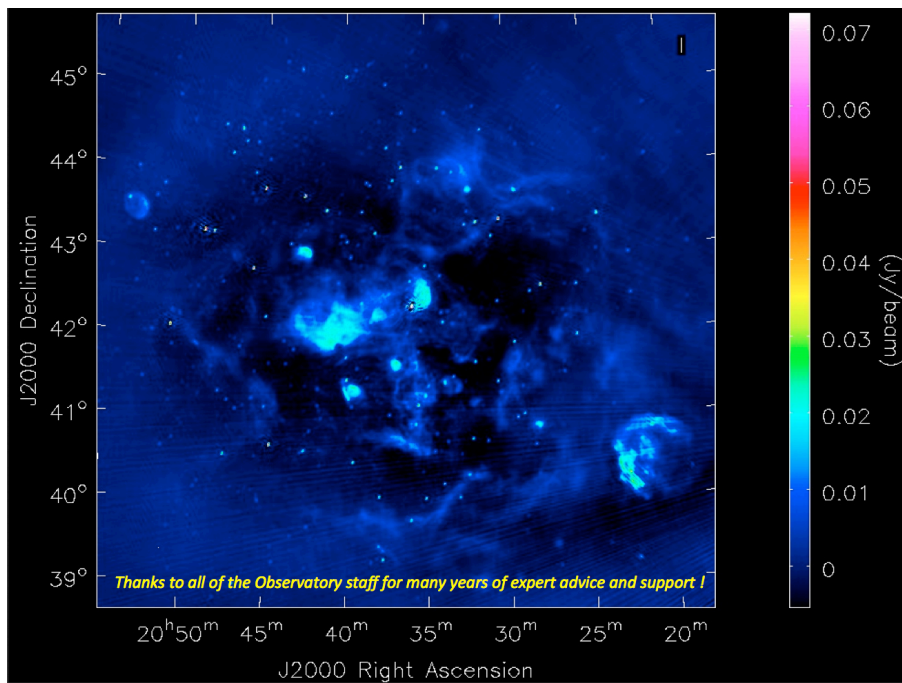


Figure 3: LOFAR LBA image of the W3 Galactic region. Credits: G. White (Open University and Rutherford Appleton Laboratory)



Figure 4: The LOFAR Science Workshop picture took on Wednesday 3 June. Credits: ASTRON.

The geographical distribution of the participants is presented in the pie chart below. 21% of the participants were women. 27% were Ph.D. students and 39% post doc.

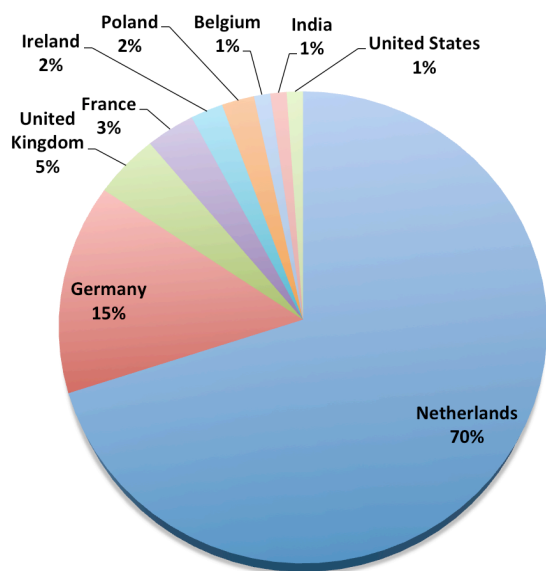


Figure 5: Country affiliation of the participants to the LOFAR meetings.

**3. Attendance list (incl. participant names, affiliation and country) signed by the participants and confirmed by the organizer**

The attendance list is attached.

**4. Financial Report / RadioNet3 contribution**

RadioNet contributed to the events with 6500 euros, used for local organization,

**5. Conference Proceedings and Web page**

No conference proceedings will be published. The events website is available here

<http://www.astron.nl/lofarscience2015/>

A collection of all the slides presented by the speakers is available here

<http://www.astron.nl/lofarscience2015/programme.php>

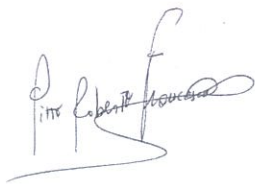


PARTICIPANTS LOFAR MEETINGS				
First Name	Last Name	Institute	Country	Country
Rainer	Beck	MPIfR	Bonn	Germany
Anna	Bilous	Radboud University	Nijmegen	Netherlands
Stefan	Blex	Astronomical Institute Ruhr-Universität Bochum	Bochum	Germany
Frank	Breitling	Leibniz-Institut fuer Astrophysik Potsdam (AIP)	Potsdam	Germany
Marisa	Brienza	ASTRON	Dwingeloo	Netherlands
Wim	Brouw	ASTRON	ZWIGGELTE	Netherlands
Bianca	Bult-Visser	Astron	Dwingeloo	Netherlands
Dario	Carbone	Anton Pannekoek Institute	Amsterdam	Netherlands
Yvette	Cendes	Anton Pannekoek Institute	Amsterdam	Netherlands
Luciano	Cerrigone	ASTRON	Dwingeloo	Netherlands
Krzysztof	Chyzy	Astronomical Observatory, Jagiellonian University	Krakow	Poland
Alex	Clarke	University of Manchester	Manchester	United Kingdom
Sally	Cooper	Uni of Manchester	Manchester	United Kingdom
Arthur	Corstanje	Radboud University Nijmegen	Nijmegen	Netherlands
Colm	Coughlan	Dublin Institute for Advanced Studies	Dublin	Ireland
Soobash	Daiboo	Paris Observatory	Meudon	France
Ger	de Bruyn	ASTRON	Dwingeloo	Netherlands
Francesco	de Gasperin	University of Hamburg	Hamburg	Germany
Adam	Deller	ASTRON	Dwingeloo	Netherlands
Tammo Jan	Dijkema	ASTRON	Dwingeloo	Netherlands
Alexander	Drabent	TLS Tautenburg	Tautenburg	Germany
Jochen	Eisoffel	Thüringer Landessternwarte	Tautenburg	Germany
J. Emilio	Enriquez	Radboud University Nijmegen	Nijmegen	Netherlands
Heino	Falcke	Radboud University Nijmegen/ASTRON/MPIfR Bonn	Nijmegen	Netherlands
Richard	Fallows	ASTRON	Dwingeloo	Netherlands
Wilfred	Frieswijk	ASTRON	Dwingeloo	Netherlands
Michael	Garrett	ASTRON	Dwingeloo	Netherlands
Jean-Mathias	Griessmeier	LPC2E Orleans/CNRS & Nancay Observatory, France	Orleans	France
Marijke	Haverkorn	Radboud University	Nijmegen	Netherlands
Jorg	Horandel	Radboud University Nijmegen	Nijmegen	Netherlands
George	Heald	ASTRON	Dwingeloo	Netherlands
Jason	Hessels	ASTRON/UvA	Dwingeloo	Netherlands
Duy	Hoang	Leiden Observatory	Leiden	Netherlands
Matthias	Hoef	Thüringer Landessternwarte	Tautenburg	Germany
Andreas	Horneffer	MPIfR	Bonn	Germany
Marco	Iacobelli	ASTRON	Dwingeloo	Netherlands
Vibor	Jelic	University of Groningen & ASTRON	Groningen	Netherlands
David	Jones	Radboud Universiteit	Nijmegen	Netherlands
Georgi	Kokotanekov	Anton Pannekoek Inst, UvA,	Amsterdam	Netherlands

		Amsterdam		
Vlad	Kondratiev	ASTRON	Dwingeloo	Netherlands
Yogesh	Maan	National Centre for Radio Astrophysics (NCRA)	Pune	India
Jasmina	Magdalenic	Royal Observatory of Belgium	Uccle	Belgium
Elizabeth	Mahony	ASTRON	Dwingeloo	Netherlands
Gottfried	Mann	Leibniz-Institut fuer Astrophysik Potsdam (AIP)	Potsdam	Germany
Maaijke	Mevius	Astron	dwingeloo	Netherlands
Klim	Mikhailov	Anton Pannekoek Institute (UvA) / ASTRON	Amsterdam	Netherlands
Javier	Moldon	ASTRON	Dwingeloo	Netherlands
Gijs	Molenaar	Anton Pannekoek Instituut	Amsterdam	Netherlands
Leah	Morabito	Leiden Observatory	Leiden	Netherlands
Raffaella	Morganti	ASTRON/Kapteyn Groningen	Dwingeloo	Netherlands
Diana	Morosan	Trinity College Dublin	Dublin	Ireland
Blazej	Nikiel-Wroczyński	Astronomical Observatory, Jagiellonian University	Krakow	Poland
Menno	Norden	Astron	Dwingeloo	Netherlands
Kristina	Nyland	ASTRON	Dwingeloo	Netherlands
Andre	Offringa	ASTRON	Dwingeloo	Netherlands
Raymond	Oonk	ASTRON / Leiden Observatory	Dwingeloo	Netherlands
Emanuela	Orru	Astron	Dwingeloo	Netherlands
Antonis	Polatidis	ASTRON	Dwingeloo	Netherlands
Irene	Polderman	RU Nijmegen	Nijmegen	Netherlands
Peeyush	Prasad	ASTRON	Eindhoven	Netherlands
David	Rafferty	Hamburg Observatory	Hamburg	Germany
Laura	Rafferty	Hamburger Sternwarte	Hamburg	Germany
Huub	Rottgering	Leiden Observatory	Leiden	Netherlands
Hamish	Reid	University of Glasgow	Glasgow	United Kingdom
Edwin	Retana-Montenegro	Leiden Observatory	leiden	Netherlands
Laura	Rossetto	Radboud University Nijmegen	Nijmegen	Netherlands
Pedro	Salas	Leiden Observatory	Leiden	Netherlands
Sotirios	Sanidas	API/UvA	Amsterdam	Netherlands
Olaf	Scholten	Univ. of Groningen / KVI-CART	Groningen	Netherlands
Katharina	Sendlinger	Astronomical Institute Ruhr-Universität Bochum	Bochum	Germany
Timothy	Shimwell	Leiden University	Leiden	Netherlands
Aleksandar	Shulevski	ASTRON	Dwingeloo	Netherlands
Charlotte	Sobey	ASTRON	Dwingeloo	Netherlands
Sarrvesh	Sridhar	Kapteyn Institute, RuG	Groningen	Netherlands
Samayra	Straal	Anton Pannekoek Institute/ ASTRON	Amstelveen	Netherlands
Cyril	TASSE	CNRS - Observatoire de Paris	Meudon	France
Sander	ter Veen	ASTRON	Dwingeloo	Netherlands
Satyendra	Thoudam	Radboud University	Nijmegen	Netherlands
Jonas	Trustedt	Universität Würzburg	Würzburg	Germany
Gia	Trinh	KVI-CART, University of Groningen	Groningen	Netherlands



Alexander	van der Horst	George Washington University	Washington, DC	United States
Sebastiaan	van der Tol	Astron	Dwingeloo	Netherlands
Cameron	Van Eck	Radboud University	Nijmegen	Netherlands
Joeri	van Leeuwen	ASTRON/U. Amsterdam	Dwingeloo	Netherlands
Rene	Vermeulen	ASTRON/ILT	Dwingeloo	Netherlands
nicolas	vilchez	ASTRON	dwingeloo	Netherlands
Glenn	White	Open University and Rutherford Appleton Laboratory	Milton Keynes	United Kingdom
Sarod	Yatawatta	ASTRON	Dwingeloo	Netherlands
Saleem	Zaroubi	Kapteyn Institute	Groningen	Netherlands



R. F . Pizzo