

FP7- Grant Agreement no. 283393 – *RadioNet3*

Project name: Advanced Radio Astronomy in Europe

Funding scheme: Combination of CP & CSA

Start date: 01 January 2012

Duration: 48 month



Deliverable 4.5

Cm – wave ERIS

Due date of deliverable: 2013-09-30

Actual submission date: 2013-11-28

Deliverable Leading Partner: University of Manchester (UMAN), United Kingdom

1. Document information

Document name: Report on organisation of the cm-wave ERIS

Type: Other

WP: 4

Authors: Anita M. S. Richards (UMAN, United Kingdom)

1.1 Dissemination Level

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

1.2 Content

1. Document information	2
1.1 Dissemination Level	2
1.2 Content.....	3
2. Report.....	4
2.1 Participant list	4
2.2 Meeting programme.....	8
2.3 Meeting Photo.....	10
2.4 Scientific report	11
2.5 Information of the EC financial contribution	11

2. Report

European Radio Interferometry School (cm-wave ERIS 2013) was hosted by ASTRON – Netherlands Institute for Radio Astronomy & JIVE – Joint Institute for VLBI in Europe on 9–13 September 2013 in Dwingeloo (the Netherlands). This school was the fifth of a series of summer schools supported by RadioNet. The event was sponsored by *RadioNet3*, the host institutes, the DAGAL Network and the University of Groningen, as well as by the Leids Kerkhoven-Bosscha Fonds (LKBF) in the Netherlands. ERIS provided a week of lectures and tutorials on how to achieve scientific results from radio interferometry:

<http://www.astron.nl/eris2013/>

The topics covered by the lectures/tutorials included:

- Calibration and imaging of continuum, spectral line, and polarization data
- Low frequency (LOFAR domain), cm-wave (e-MERLIN domain), decimetre-wave (HI/OH domain), high frequency (ALMA/IRAM domain), and VLBI interferometry
- Extracting the information from astronomical data and interpreting the results
- Choosing the most suitable array and observing plan for your project

Previous ERIS schools:

- Manchester, 5-9 September 2005 (<http://www.radionet-eu.org/rnwiki/SchoolOrganisationPages>)
- Bonn, 10-15 September 2007 (<http://www3.mpifr-bonn.mpg.de/div/eris/>)
- Oxford, 7-11 September 2009 (<http://astrowiki.physics.ox.ac.uk/ERIS2009>)
- Rimini, 5-10 September 2011 (<http://www.ira.inaf.it/meetings/rm11/>)

The social events included a conference dinner at Westerbork, a visit to the LOFAR core, and a football match.

2.1 Participant list

Participants from 14 different European countries (Austria, Belgium, Bulgaria, Finland, France, Germany, Greece, Italy, Netherlands, Poland, Serbia, Spain, Sweden, UK) attended the event, in addition to 3 students from Ethiopia, Chile and South Africa. There were 95 participants:

Nr.	Name	Affiliation	Country
1.	Abreu-Vicente, Jorge	Instituto de Astrofísica de Andalucía	Spain
2.	Azulay, Rebecca	Universidad de Valencia	Spain
3.	Baczko, Anne-Kathrin	Dr. Karl Remeis Observatory	Germany
4.	Bigay, Fernando	Liverpool John Moores University	United Kingdom
5.	Blasco Herrera, Javier	Instituto Astrofisico de Andalucia	Spain
6.	Boccardi, Biagina	MPIfR	Germany
7.	Borisov, Galin	Institute of Astronomy and National Astronomical O	Bulgaria

8.	Bouquin, Alexandre	Universidad Complutense de Madrid	Spain
9.	Braibant, Lorraine	Liège (Luik) University	Belgium
Nr.	Name	Affiliation	Country
10.	Cassaro, Pietro	INAF IRA	Italy
11.	Castro, Sandra	ESO	Germany
12.	Censier, Benjamin	Station de radioastronomie de Nançay	France
13.	Cisternas, Mauricio	Instituto de Astrofisica de Canarias	Spain
14.	Clarke Alex	University of Southampton	United Kingdom
15.	Connolly, Samuel	University of Southampton	United Kingdom
16.	Cooper, Sally	University of Manchester	United Kingdom
17.	Damas Segovia, Ancor	Max Planck Institute for Radio Astronomy	Germany
18.	Demetroullas, Constantinos	University of Manchester	United Kingdom
19.	Diaz Garcia, Simon	University of Oulu / Astronomy Division	Finland
20.	Dijkema, Tammo Jan	ASTRON	Netherlands
21.	Fragkoudi, Francesca	Laboratoire d'Astrophysique de Marseille	France
22.	Giese, Nadine	Kapteyn Astronomical Institute	Netherlands
23.	Goldman, Steven	Keele University	United Kingdom
24.	Harrison, Ian	Cardiff University	United Kingdom
25.	Hempel, Maren	Universidad Catolica de Chile	Chile
26.	Herrera Endoqui, Martin	University of Oulu / Astronomy Division	Finland
27.	Herrera Ruiz, Carmen Noelia	Astronomisches Institut der Ruhr-Universität Boch	Germany
28.	Jeremy, Tige	Laboratoire d'Astrophysique de Marseille	France
29.	Juárez, Carmen	Institut de Ciències de l'Espai (CSIC-IEEC)	Spain
30.	Karamanavis, Vassilis	MPIfR	Germany
31.	Kiehlmann, Sebastian	Max-Planck-Institut für Radioastronomie	Germany
32.	Kifle Hailemariam, Mekuanint	Addis Ababa University	Ethiopia
33.	Kim, Sam	Pontificia Universidad Catolica de Chile	Chile
34.	Kimani, Naftali	Max-Planck Institute für Radioastronomie	Germany
35.	Gale-Sides Kingsley	Keele University	United Kingdom
36.	Kouroublakis, Minas	Hellenic Open University	Greece
37.	Kreikenbohm, Annika	Lehrstuhl fuer Astronomy, Universitaet Wuerzburg	Germany
38.	Lasanen, Sari	University of Oulu	Finland
39.	Leaman, Ryan	Instituto de Astrofisica de Canarias	Spain

Nr.	Name	Affiliation	Country
40.	Lippa, Magdalena	Max Planck Institute for extraterrestrial physics	Germany
41.	Maccagni, Filippo	Kapteyn Astronomical Institute, Rijksuniversiteit	Netherlands
42.	Macias, Enrique	Instituto de Astrofisica de Andalucia	Spain
43.	Marcote, Benito	University of Barcelona	Spain
44.	Martin, Poppy	University of Southampton	United Kingdom
45.	Nisbet, David	Institute for Astronomy	United Kingdom
46.	Obrocka, Monika	Jodrell Bank Observatory	United Kingdom
47.	Pandey, Vishambhar	Astron	Netherlands
48.	Pasetto, Alice	Max-Planck-Institute for Radioastronomy	Germany
49.	Patil, Ajinkya	Kapteyn Astronomical Institute	Netherlands
50.	Ponomareva, Anastasia	Kapteyn Astronomical Institute	Netherlands
51.	Pritchard, Jonathan	Imperial College London	United Kingdom
52.	Pupillo, Giuseppe	IRA - INAF	Italy
53.	Querejeta, Miguel	Max Planck Institute for Astronomy	Germany
54.	Ramatsoku, Mpati	Kapteyn Astronomical Institute	Netherlands
55.	Ramirez Moreta, Pablo	Instituto de Astrofisica de Andalucia IAA-CSIC	Spain
56.	Rastello, Sara	University of Bologna	Italy
57.	Reid, Hamish	University of Glasgow	United Kingdom
58.	Retana-Montenegro, Edwin	Leiden Observatory	Netherlands
59.	Riseley, Christopher	University of Southampton	United Kingdom
60.	Rivi, Marzia	University of Oxford	United Kingdom
61.	Rodeghiero, Gabriele	University of Padova	Italy
62.	Roeck, Benjamin	Instituto Astrofísica de Canarias	Spain
63.	Sipior, Michael	ASTRON	Netherlands
64.	Smith, Matthew	Cardiff University	United Kingdom
65.	Tapsoba, Blaise	University of Cape Town	South Africa
66.	Temporin, Sonia Giovanna	Institute for Astro- and Particle Physics, Univers	Austria
67.	Topal, Selcuk	Astrophysics Department, University of Oxford	United Kingdom
68.	Traficante, Alessio	University of Manchester	United Kingdom
69.	Trüstedt, Jonas	University of Wuerzburg	Germany
70.	Tsatsi, Athanasia	MPIA	Germany
71.	van Amesfoort, Alexander	ASTRON	Netherlands

Nr.	Name	Affiliation	Country
72.	Vilchez, Nicolas	ASTRON	Netherlands
73.	Whittaker, Lee	University of Manchester	United Kingdom
74.	Wiegert, Joachim	Onsala Space Observatory	Sweden
75.	Wołowska, Aleksandra	Nicolaus Copernicus University	Poland
76.	Wolter, Anna	INAF-Osservatorio Astronomico di Brera	Italy
77.	Wu, Yuanwei	MPIfR	Germany
78.	Xu, Dong	Dark Cosmology Centre	Denmark
79.	Yildiz, Mustafa Kursad	Kapteyn Astronomical Institute	Netherlands
80.	Zhang, Chaoli	Leiden Observatory	Netherlands
81.	Disney, Michael	Cardiff School of Physics and Astronomy	United Kingdom

TUTORS

Nr.	Name	Affiliation	Country
82.	Bosma, Albert	Laboratoire d'Astrophysique de Marseille	France
83.	Bremer, Michael	Institut de Radio Astronomie Millimetrique	France
84.	Dallacasa, Daniele	Dep of Physics and Astronomy, UniBO	Italy
85.	Flacke, Heino	Radboud Nijmegen	Netherlands
86.	Laing, Robert	ESO	Germany
87.	McKean, John	ASTRON	Netherlands
88.	Muxlow, Tom	Jodrell Bank	United Kingdom
89.	Pizzo, Roberto	ASTRON	Netherlands
90.	Richards, Anita	JBCA Univ. of Manchester	United Kingdom
91.	Schmalzl, Marcu	Leiden University	Netherlands
92.	Tilanus, Remo	Leiden University	Netherlands
93.	Venturi, Tiziana	INAF, Istituto di Radioastronomia	Italy
94.	Verheijen, Marc	Rijksuniversiteit Groningen	Netherlands

2.2 Meeting programme

Monday 9 September 2013

08.50	Welcome	R. Vermeulen & L. Gurvits
09.00	Interferometric Radio Science	T. Muxlow
09.45	Fundamentals of Interferometry	R. Laing
10.30	Coffee Break	
11:00	Modern interferometers	J. McKean
11.45	Data acquisition and calibration	D. Dallacasa
12.30	Lunch	
14.00	From visibilities to images	T. Muxlow
14.45	Radio astronomical data formats and packages	A. Richards
15.15	Coffee break	
15.45	Tutorial T1: Calibration	D. Dallacasa et al.
17.30	Introduction to Tutorials T7 and T9 'writing a proposal'	R. Laing et al.
18.45	Guided visit at WSRT	
20.00	School dinner	

Tuesday 10 September 2013

09.00	Polarisation: data acquisition, calibration and imaging	M. Brentjens
09.45	Spectral line interferometry: science and principles	M. Verheijen
10.30	Coffee break	
11.00	Spectral line interferometry in practice	C. Goddi
11.45	Millimetre interferometry	M. Bremer
12.30	Lunch	
14.00	Tutorial T2: Imaging – continuum and polarization	J. McKean et al.
15.45	Coffee break	
16.15	(Sub)mm observing & data reduction in practice	A. Richards
17:00	Tutorial T3: Introduction to CASA: spectral line data reduction	A. Richards et al.
19:00	Dinner	
21:00	Evening lecture: 'SKA Precursors'	A. Bosma

Wednesday 11 September 2013

09.00	Low frequency interferometry	R. Pizzo
09.45	Low frequency observing & data reduction in practice	J McKean
10.30	Coffee break	
11.00	Tutorial T4: LOFAR bits 1	J. McKean et al.
12.45	Lunch	
14.00	Visit to LOFAR core	
18.30	Soccer game & dinner	

Thursday 12 September 2013

09.00	VLBI techniques	B. Campbell
09.45	Continuum image analysis and error recognition	R. Laing
10.30	Coffee break	
11.00	Tutorial T5: VLBI – calibration and imaging	Z. Paragi et al.
12.30	Lunch	
14.00	Writing proposals and scheduling	T. Venturi
14.45	Tutorial T6: Writing a proposal	R. Laing et al.
15.45	Coffee break	
16.15	Tutorial T7: Image analysis and error recognition in images	R. Laing et al.
19.00	Dinner	
21.00	Evening lecture: ‘Astroparticle detection with radio interferometers’	H. Falcke

The teachers and main tutors are also listed below:

Albert Bosma – LAM (France)
 Michael Bremer – IRAM (France)
 Michiel Brentjens – ASTRON (Netherlands)
 Bob Campbell – JIVE (Netherlands)
 Daniele Dallacasa - Dep of Physics and Astronomy, UniBO (Italy)
 Heino Falcke - Radboud University (Netherlands)
 Ciriaco Goddi – JIVE (Netherlands)
 Robert Laing – ESO-ALMA (Germany)
 John McKean – ASTRON (Netherlands)
 Tom Muxlow – JBCA (UK)
 Emanuela Orru’ – ASTRON (Netherlands)
 Zsolt Paragi – JIVE (Netherlands)
 Roberto Pizzo – ASTRON (Netherlands)
 Anita Richards – JBCA (UK)
 Tiziana Venturi – INAF (Italy)
 Marc Verheijen – RUG (Netherlands)

All lectures and tutorial information are on-line at

<http://www.astron.nl/eris2013/software.php>
<http://www.astron.nl/eris2013/lectures.php>

2.3 Meeting Photo



2.4 Scientific report

The Fifth European Radio Interferometry School (ERIS) was hosted by ASTRON and JIVE in Dwingeloo, the Netherlands, on 9-13 September 2013.

ERIS provided a week of lectures and tutorials on how to achieve scientific results with radio interferometry. 81 regular participants attended the event, together with tutors and helpers. In total we accommodated about 100 people. The lectures and tutorials took place in the brand new Auditorium in the new building of Astron/JIVE. The topics covered by the lectures/tutorials included:

- Low frequency (LOFAR domain), cm-wave (e-MERLIN domain), decimeter-wave (HI/OH domain), high frequency (ALMA/IRAM domain), and VLBI interferometry: science, instrumentation and data reduction.
- Calibration and imaging of continuum, spectral line, and polarization data. The tutorials used the AIPS, CASA and (optionally) GYPSY packages, including advice on how to choose the best package for a particular purpose. There was also a session on error recognition.
- Extracting the information from astronomical data and interpreting the results. This was covered both in science lectures and in a hands-on data analysis tutorial.
- Choosing the most suitable array and observing plan for a project, by forming small groups to write 'virtual' observing proposals on topics chosen by the students, either for existing telescopes or future instruments like the SKA. Targets ranged from comets to the physics of AGN to distant cosmology, with a large group led by DAGAL considering high-redshift HI imaging.

2.5 Information of the EC financial contribution

The total costs of the meeting were approx. €40.000 for travel, covering the accommodation, food and other costs such as bike hire and transport to the visits to Westerbork and LOFAR. Most participants paid a registration fee of €150, and financial support was also received from DAGAL, the hosts ASTRON and JIVE, and the LKBF (Leids Kerkhoven-Bosscha Fonds).

The RadioNet3 contribution of €15750, of which approx.2000€ was used to support the travel of 3 students who would not otherwise have been able to attend and contribute towards accommodation and subsistence:

- Kifle Hailemariam Mekuanint (Addis Ababa University, Ethiopia)
- Kouroublakis Minas (Hellenic Open University, Greece)
- Zhang Chaoli (Leiden University, the Netherlands)

The rest of the support was used by the local organisers towards the cost of accommodation, transportation and meals for the participants.

Copyright

© Copyright 2012 RadioNet3

This document has been produced within the scope of the RadioNet3 Projects.

The utilization and release of this document is subject to the conditions of the contract within the 7th Framework Programme, contract no, 283393