

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

**TITLE: E-MERLIN EARLY SCIENCE MEETING**

**DATE:** *10-11 APRIL 2014*                      **TIME:** (WHOLE DAY)

**LOCATION:** *MANCHESTER, UK*

**MEETING WEBPAGE** <http://www.jb.man.ac.uk/meetings/emerlin2014/>

**HOST INSTITUTE:** *UNIVERSITY OF MANCHESTER*

**PARTICIPANTS NO:** *34*

**MAIN LEADER:** *UMAN*

## REPORT:

### 1. Agenda of the meeting

#### Thursday 10 April

10.30 Welcome (Simon Garrington, Manchester)

Session 1: Extragalactic Astronomy

11.00 The SuperCLASS project (Richard Battye, Manchester)

11.25 Resolving key questions in extragalactic jet physics (Robert Laing, ESO)

11.50 The lensing legacy project and radio-"quiet" objects (Neal Jackson, Manchester)

12.15 Central images in lens systems with e-MERLIN (Jonathan Quinn, Manchester)

12.40 Lunch

14.00 The e-MERGE project (Tom Muxlow, Manchester)

14.25 The eMERLIN legacy project LIRGI: Luminous Infrared Galaxy Inventory (Ruben Herrero-Illana, Andalucia)

14.50 MicroJy radio source sizes (Nick Wrigley, Manchester)

15.15 Tea

15.30 First sub-arcsec resolution observations of the GOODS-N region at 5 GHz: the origin of radio emission in distant galaxies (Daria Guidetti, Bologna)

15.55 LEMMINGs (Ian McHardy, Southampton)

16.20 e-MERLIN and JVLA results on IC10 (Elias Brinks, Hertfordshire)

19.00 Workshop dinner

#### Friday 11 April

Session 2: Galactic astronomy

09.30 e-MERLIN observations of Betelgeuse (Anita Richards, Manchester)

09.55 The PEBBLES project (Jane Greaves, St Andrews)

10.20 Mon 2012 (Tim O'Brien, Manchester)

10.45 Coffee

11.10 e-MERLIN Measurements of the DG Tau Jet: Status Update from the Thermal Jets Legacy Programme (Rachael Ainsworth, DIAS, Dublin)

11.35 e-MERLIN observations of W49 (Sandra Etoka, Hamburg)

12.00 Phase-lag distances of OH masing AGB stars (Dieter Engels, Hamburg)

12.25 Lunch

13.45 COBRAS (Danielle Fenech, UCL)

14.10 SERPENT (Luke Peck, UCL)

14.35 The e-MERLIN pipeline (Megan Argo, Manchester)

14.45 Open discussion on Futures of Interferometry: from e-MERLIN to the SKA (conveners: Richard Schilizzi, Simon Garrington)

16.00 End of meeting

## 2. Scientific Summary

### Overview

The *e*-MERLIN radio interferometer has been operating in commissioning mode for approximately two years, with the first full science proposal round (Cycle 1) conducted last year. *e*-MERLIN is an instrument consisting of six telescopes within the UK, with a maximum baseline of 220km, and the ability consistently to produce images with 50-200 mas resolution, depending on frequency, at microJy sensitivity levels made possible by a recent upgrade involving optical fibre connections between the two telescopes and a new correlator at Jodrell Bank, University of Manchester, where the array is centred. Successful proposers have been obtaining full science data from mid-2013 onwards. It was therefore appropriate to organise two meetings, one in order to help proposers with reduction and analysis of the data being produced, and a second to present early scientific results. The first meeting was held in January 2014, three months before the second (April 2014). This report covers the second meeting (the first was supported by RadioNet under the New Skills programme).

### *e*-MERLIN Early Science Meeting

The *e*-MERLIN Early Science Meeting was held in the Turing Building, University of Manchester, between 10 and 11 April. The aim of the meeting was to allow participants to present results from the first year of *e*-MERLIN observations; in many cases these were preliminary images from Cycles 0 and 1, with descriptions of likely further developments both in Legacy programmes (allocated by open competition in a proposal round in 2009-10) and in standard observations which were competitively allocated in 2013. Many of the early-stage researchers attending the meeting had previously benefited from attendance at the data school three months before.

There were two days of science talks, the first (10.30-16.45) on extragalactic science and the second (09.30-15.00) on galactic science. Both Legacy programmes and standard Cycle 0/1 programmes were described. The Legacy programmes contributing included the SuperCLASS weak radio-lensing project, the *e*-MERGE programme to make deep radio maps of significant radio fields with multi-wavelength data, the jet physics Legacy programme, the gravitational lensing programme, the LEMMINGs nearby galaxies programme, the PEBBLES planetary disk programme, the Thermal Jets Legacy Programme and the COBRAs Cyg OB association programme. Other cycle 0/1 programmes presented included *e*-MERLIN/JVLA programmes on gravitational lenses, and results on individual objects such as IC10 and S140. In addition, there were a small number of technical talks on SERPENT, the automatic RFI flagger for *e*-MERLIN being developed at UCL, and the *e*-MERLIN pipeline being developed at JBCA, Manchester.

The contribution of RadioNet was mentioned in the initial welcome address, and a talk about the aims of RadioNet and a guide to obtaining further information was given during the meeting by Anita Richards. There was a final discussion session at the end of the second day, convened by Simon Garrington and Richard Schilizzi, on the future of *e*-MERLIN and the pathway to the Square Kilometre Array (SKA). Useful inputs were obtained from attendees in the field of future upgrades to *e*-MERLIN and the likely scientific case for operation of *e*-MERLIN up to the construction of the full SKA.

Main highlights included the successful production of maps at the expected noise level in blank fields with the e-MERGE survey, which should eventually lead to the deepest maps produced at this high resolution (Muxlow); improved lensing constraints on the mass slopes within the central 50pc of a lensing galaxy at redshift 0.5 (Quinn); high-sensitivity e-MERLIN results on the circumstellar environment of Betelgeuse (Richards) and the first observations in a campaign to do weak-lensing analysis in the radio (Battye) with control of systematics which affect optical weak lensing using radio polarization of faint galaxies.

In addition, the participants were provided with lunch on both days, coffee/tea and a conference dinner on Thursday 10th at the Red Chilli, a local restaurant. Participants were asked for a small registration fee (30 GBP), which did not cover the total cost of catering, including lunches on both days, tea and coffee during the meeting. The claim associated with this report requests funding for the difference in cost.

Most of the participants were either those directly involved in the reduction and analysis of e-MERLIN data, or their supervisors or close collaborators. Of the attendees, approximately half are faculty/permanent staff, and half are postdocs or PhD students. 11/34 of the participants are women.

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

*List of participants: Simon Garrington (Manchester), Martin Hardcastle (Herts), Melvin Hoare (Leeds), Jonathan Westcott (UCL), Elias Brinks (Herts), Petrus van Oers (Southampton), Antxon Alberti (Andalucia), Ruben Herrero-Illana (Andalucia, ES), Luke Maud (Leeds), Naim Ramirez (Andalucia, ES), Jonathan Quinn (Manchester), Stewart Eyres (Lancashire), Jeremy Harwood (Southampton), Rachael Ainsworth (DIAS, Dublin, IE), Jane Greaves (St Andrews), Sam Connolly (Southampton), Sandra Etoke (Hamburg, DE), Danielle Fenech (UCL), Luke Peck (UCL), Daria Guidetti (Bologna, IT), Isabella Prandoni (Bologna, IT), John Conway (Onsala, SE), Robert Laing (ESO, DE), Ian McHardy (Southampton), Katharine Johnston (MPIA, Munich, DE), Jack Morford (UCL, UK); Neal Jackson, Tom Muxlow, Megan Argo, Anita Richards, Nick Wrigley, Tim O'Brien, Richard Schilizzi (Manchester), Carole Mundell (Liverpool JMU). In addition, staff at JBCA, Manchester, attended some talks, which were of scientific interest to them.*

*Scientific organising committee: Neal Jackson (Manchester), Melvin Hoare (Leeds), Martin Hardcastle (Herts).*

*List confirmed by Neal Jackson (Chair, SOC and LOC).*

*Neal Jackson*

#### **4. Financial Report / RadioNet3 contribution**

Participants were provided with lunch on both days, coffee/tea and a conference dinner on Thursday 10th at the Red Chilli, a local restaurant. Participants, apart from internal attendees helping with the organisation of the meeting or data school or both, were asked for a small registration fee (30 GBP) which did not cover the total cost of catering, including lunches on both days, tea and coffee during the meeting. The claim associated with this report requests funding for the difference in cost.

#### **5. Conference Proceedings and Web page**

Attendees were asked to provide their talks in pdf. These are being put up on the conference webpage as they are submitted:

<http://www.jb.man.ac.uk/meetings/emeralin2014/schedule1.html>