



MERLINnews MERLIN/VLBI National Facility



Newsletter

Number 14: March 2006

Editor: T.W.B. Muxlow (twbm@jb.man.ac.uk)

Contents

1. Call for Proposals
2. Director's Report
3. e-MERLIN Update
4. Topical News and Recent Science

1. Call for Proposals

The **deadline** for the receipt of proposals for Semester 06B (October 2006 - January 2007) on MERLIN is **March 15th, 2005**. Details in: <http://www.merlin.ac.uk/propsub/call> Wavebands available:

L-Band: 1.33GHz to 1.43 GHz & 1.57 GHz to 1.73 GHz

C-Band 4.5 GHz to 5.2 GHz & 6.0 GHz to 6.8 GHz

K-Band 22.0 GHz to 24.0 GHz

- The Lovell Telescope will be available at both C and L-Bands for periods during Semester 06B*
- It is envisaged that frequency flexibility between complete observing runs will be available

Proposals should be submitted via the new MERLIN web-based proposal tool

Available at: <http://www.merlin.ac.uk/propsub/Northstar>

The system parameters for observation of a continuum source in **good weather conditions** are;

	L-Band	C-Band	K-Band
Maximum angular resolution (mas)	~ 150	~ 40	~ 8
RMS for 12 hr. on source (μ Jy/beam)	~ 60/30	~ 60/30	~ 400
Maximum bandwidth/polarization (MHz)	~ 15	~ 15	~ 15

*The use of the Lovell telescope at L-Band and C-Band reduces the 12 hour RMS noise level from ~60 to ~30 μ Jy/beam. The maximum rate at which the observing frequency can be switched within an observing band will be approximately once every five minutes for multi-frequency synthesis (MFS) observations. MFS is possible within each C-Band range (eg 4.5 GHz-5.2 GHz), but not possible between 4.5/5.2 GHz and 6/7 GHz. For spectral line work throughout the Semester, users are referred to Table 4.4 of the MERLIN User Guide Version 3 which is now available online. The maximum number of frequency channels per baseline to be divided between the 4 polarizations for bandwidths of 16 MHz, 8 MHz and 4 MHz are 64, 128 and 256, respectively. The number of frequency channels per baseline to be divided between the 4 polarizations will be 512 for bandwidths of 2 MHz or less. The minimum total bandwidth is 250 kHz.

Access to MERLIN for Scientists from EU Countries:

MERLIN is one of the participating institutes in the RadioNet (<http://www.radionet-eu.org>) project from which transnational access within the EU to existing observing facilities is financially supported.

There will be MERLIN+EVN observations in October / November 2006. Applications to go to the EVN PC (<http://www.evlbi.org/>)

2. Director's Report

In the previous MERLIN Newsletter I reported on the International Review of the future operations of e-MERLIN and the National Facility. This was part of a process in which PPARC conducted a review of its entire programme for the period up to mid 2008. This is in the context of flat-funding for PPARC; such a situation is producing severe pressure on the budget and it was clear that choices have to be made. On March 6, PPARC council announced the result of its deliberations (www.pparc.ac.uk/Nw/Council0306.asp). For e-MERLIN the Council have decided to maintain the resources available, but '*below the desired requirement*'. This means that the operations budget of the National Facility will not be increased as we had requested. This is an uncomfortable situation as we are approaching the final year or so of e-MERLIN construction and need to ramp up our operations and user support team as commissioning begins; the full ramifications of the decision will become clear as we conduct an internal review of the budget and resources required.

The report of the International Review Panel is now available on the MERLIN website (www.merlin.ac.uk/e-MERLIN_IntReview.pdf) and provides extremely strong support for e-MERLIN while highlighting a couple of areas which require greater concentration of resources. The Executive Summary of the panel's report is provided below:

e-MERLIN will provide the UK with a unique and world-leading capability in widefield, high-resolution radio astronomy until at least the middle of the next decade. It will complement new facilities at other wavelengths providing critical information at centimetre wavelengths required to address many of the most important astronomy questions of the coming decade. As such, e-MERLIN will play an important role in the multi-wavelength approach required to address the high priority science goals of PPARC's astronomy programme over the coming decade. As a key component of the European VLBI network, e-MERLIN will also contribute significantly towards maintaining the UK's leading role in European radio astronomy. By maintaining/developing skills in radio astronomy engineering, e-MERLIN will also further enhance UK's role in the design, construction and operation of next-generation of radio astronomy facilities, particularly the Square Kilometre Array. e-MERLIN should be supported at level commensurate with a front-rank international facility. Additional resources required may be supported in part through new investment in SKA development, or via consortia assembled to conduct campaign science programmes on the facility. With modest initial investment, further operating efficiencies may be gained, without significantly increasing the 'whole of life' costs for e-MERLIN over currently planned levels.

One of the major recommendations of the panel was that we should investigate the establishment of broadly based science consortia to propose and carry out some of the major e-MERLIN survey programmes. To this end, the MERLIN Steering Committee and the Director of the National Facility are in the process of establishing a Legacy Project programme, which will be open to all astronomers. Further information on this programme will be provided in separate e-mails as the ideas develop.

P.J. Diamond (pdiamond@jb.man.ac.uk)

3. e-MERLIN Update

There has been significant and encouraging progress on the e-MERLIN construction project over the last 6 months:

- The development of the samplers and IF system is continuing, and a new platform to house the new IF equipment is being constructed on the Mk2 telescope at Jodrell Bank. The IF development has focused on the phase-locked LO multiplier stages which will be tested in the prototype IF system on the Mk2 telescope in the summer.
- In the RF area, we have tested the new L-band lens/horn combination, following the fitting of the replacement L-band lens on the E-Systems telescope at Knockin. After fitting additional reflective cladding in the secondary focus cabin, we are now close to the expected system performance at this frequency. New filters at L-band to cover the 1.3-1.7 GHz band are being tested. We heard this

week that work on the lenses for Darnhall and Pickmere has progressed faster than expected and so those lenses and the L-band horns will be fitted on to the telescopes during April.

- A new internal lens has been designed to improve the illumination of the C-band horn and this is now being machined. The remaining C-band cryostats are being outfitted and will be installed over the summer.
- Work continues on the commissioning and testing of the digital transmission system which formats, modulates and multiplexes data at 30 Gb/s using optical signals on 3 wavelengths on a single fibre from each telescope. These boards have been developed by NRAO and will be used for EVLA, ALMA and *e*-MERLIN (in different configurations).
- Work on the software for controlling *e*-MERLIN is also progressing well. The design of the new software for the Online Telescope Control Computer (OTCC) has now been completed by Roger Noble, the system architect, and the implementation is now underway.
- Work on the WIDAR correlator for *e*-MERLIN, being built at DRAO in Penticton, is on track. The correlator chip is going through the wafer run at the manufacturer, the station board has recently undergone a critical design review and intense testing of other components is occurring.

S.T. Garrington (stg@jb.man.ac.uk)

4. Topical News and Recent Science

A Web-based proposal tool for MERLIN – the first stage of a beginning-to-end system

Over the past few months the MERLIN team, in collaboration with the software group at ASTRON, has developed a new web-based proposal submission tool for MERLIN called "NorthStar" (Figure 1). This tool has just been deployed and is now the recommended method by which all MERLIN users should apply for time. NorthStar has been developed from an initiative by the EU-funded RadioNet project.



Figure 1: The NorthStar entry portal on the MERLIN website for web-based MERLIN proposal submission.

The new MERLIN web-based proposal tool "NorthStar" is designed to replace the traditional LaTeX forms that MERLIN has used for proposals for a number of years. Whilst a few die-hard fans of LaTeX may mourn this loss of the traditional forms, NorthStar is designed to provide a more straightforward user interface for MERLIN.

NorthStar provides significant improvements for both MERLIN users and operations staff. For MERLIN users it will provide a comprehensive and easy to use framework within which they can propose for time. Once a proposer has registered to use NorthStar their details will be held securely on the MERLIN database. Following registration NorthStar will email users their password details allowing them access to the tool. Users will only have to register once; this only takes a few minutes and it is strongly encouraged that all potential MERLIN users should register early and explore the new tool in advance of the upcoming proposal deadline. Access to the MERLIN NorthStar tool and full documentation on its use is available at: (<http://www.merlin.ac.uk/prosub/Northstar/>).

One of the immediate user benefits NorthStar will provide is the storage and access to all MERLIN proposals where the registered user is either a PI or Co-I. This facility allows users to not only access older proposals made using the tool, but also drafts of proposals that are yet to be submitted. It is hoped that this facility will help and encourage collaboration between co-investigators.

Whilst the development of NorthStar has been primarily driven by the benefits it will bring to MERLIN users, NorthStar also will store MERLIN user and proposal information. This database will result in a reduction of administrative work for the MERLIN team and ultimately it is intended that NorthStar will become the first part of beginning-to-end system that will track all projects from the proposal stage through assessment, scheduling, archiving and data reduction to final publication.

R. Beswick (rbeswick@jb.man.ac.uk)

Recent MERLIN monitoring of the recurrent nova RS-Ophiuchi

T.J. O'Brien, T.W.B. Muxlow, S.T. Garrington, R.J. Davis (JBO); S.P.S. Eyres (UCLAN); M.F. Bode (LJMU); R.W. Porcas (MPIfR); A. Evans (Keele).

RS Ophiuchi is a recurrent nova comprising a Roche-lobe filling red giant and a white dwarf. Every 10-30 years or so, a thermonuclear runaway in material accreted from the red giant onto the white dwarf results in a nova eruption and the object brightens significantly, becoming visible to the naked eye. On 2006 Feb 12th, it was spotted by Japanese astronomers at a visual magnitude of 4.5, its first outburst for 21 years (CBET 399). During the last outburst in 1985 highlights of a multi-frequency campaign of observations included: the EXOSAT detection of bright evolving X-ray emission from hot shocked gas; a complex radio light curve measured with the Jodrell Bank MkIa-II Broad-Band Interferometer and the VLA; and evidence for an extremely bipolar radio source in an EVN image. These observations were interpreted as the result of the expansion of a shock wave through pre-existing red giant wind that makes this a low-energy but much faster-evolving analogue of a Type II supernova remnant

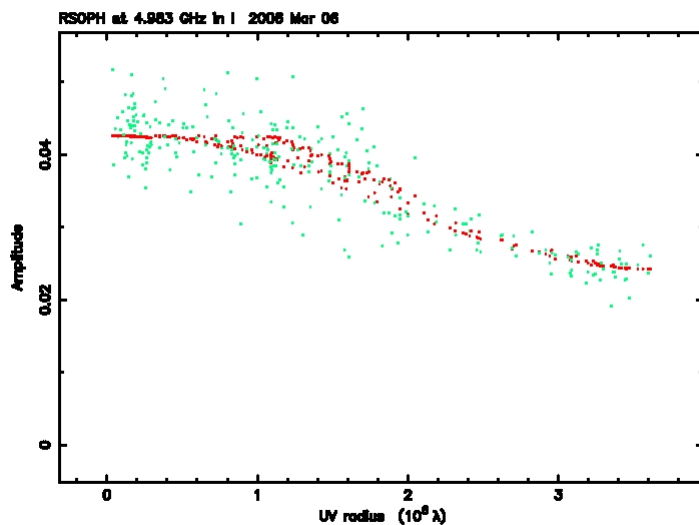


Figure 2: A plot of the dataset amplitudes (Jy) against the projected spatial frequency separation (Millions of wavelengths) for the MERLIN 5GHz observations of RS-Ophiuchi on March 6th 2006. The observed data are shown in green and the transformed fitted model is shown in red. The drop in amplitudes beyond 1 Million wavelengths is caused by MERLIN resolving the radio structure .

During this outburst X-ray observations are being obtained with Swift, Chandra and XMM-Newton. Radio observations include regular monitoring with MERLIN, VLA and VLBI imaging with EVN and VLBA.

Thus far there have been eight epochs of MERLIN imaging, the first just four days after outburst showing the source rapidly brightening. On March 2nd MERLIN imaging began to resolve the structure of the expanding ejecta – just 17 days after the nova explosion. Further imaging 4 days later (Figure 2) shows the source to be unambiguously resolved east-west with modelling indicating that it may consist of several components (IAUC 8684).

T. O'Brien (tob@jb.man.ac.uk)

MERLIN/VLBI National Facility, Jodrell Bank Observatory, University of Manchester,
Macclesfield, Cheshire SK11 9DL, United Kingdom
Telephone: +44 (0)1477 571321, Facsimile: +44 (0)1477 571618
e-mail: merlin@jb.man.ac.uk