



# Report from the event supported by RadioNet

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**TITLE** *LOFAR MKSP Annual Meeting and Busy Days*

**DATE:** *23.-25.09.2019*

**LOCATION:** *BOCHUM, GERMANY*

**MEETING WEBPAGE:** *[HTTPS://WWW.ASTRO.RUB.DE/ASTRONOMIE/MKSP2019/](https://www.astro.rub.de/astromie/mksp2019/)*

**HOST INSTITUTE:** *ASTRONOMISCHES INSTITUTE OF THE RUHR UNIVERSITY BOCHUM*

**RADIONET  
BENEFICIARY / NO:** *OSO/07*

# Report:

## 1 SCIENTIFIC SUMMARY

With the start of operation of digital phased array telescopes the area of low frequency, m-wave radioastronomy has grown into a very active field during the last years, not in the least due to the European LOFAR array. Six of the LOFAR stations are located in Germany, one is operated by the Ruhr-University (in collaboration with the Jülich research center). In Germany groups at national research centers (e.g. MPIfR, MPIA, AIP) and at several universities are active in m-wave radio astronomy, forming a fast growing community within the German astronomy.

Of the 6 LOFAR Key Science Programs, the Magnetism KSP (MKSP) is dedicated to the exploration of magnetic fields (via observation of non-thermal emission and its polarization) of a multitude of sources (e.g. pulsars, the interstellar medium of the Milky Way, galaxies, galaxy groups, galaxy clusters, and the intergalactic medium). The meeting was the next in the series of annual meetings of the MKSP community to discuss the newest results, and new methods of data reduction and analysis, as well as to plan strategies for future observation projects.

This time special emphasis was devoted to RM grids and synergies with the Surveys KSP. The Meeting consisted of a science meeting during the first 1 day and the following 3 mornings and several practical / technical workshops (“busy days”) during in the afternoons of the three days and the morning of the last day. The increased emphasis on time assigned to actually work together in smaller and larger groups on specific topics was much lauded by the participants.

### RELEVANCE FOR RADIONET

LOFAR is an international, European telescope, and a RadioNet facility. The annual MKSP meeting is intended to strengthen the collaboration between the many groups in Europe (and e.g. Australia and South Korea) which are using this unique and complex telescope. The size and complexity of the data and their large information content still is not fully unlocked and personal exchange on science ideas and data reduction and analysis techniques are of especially high value at this stage of the LOFAR project.

The MKSP lists more than 100 members, many of them young scientists working on their PhD and young postdocs. At this relatively early career stage networking and discussion possibilities at a smaller scale, dedicated meeting will be extremely helpful. We used the RadioNet support to significantly lower the financial barrier for e.g. PhD students to attend the MKSP meeting and to help compiling a high profile and diverse science program.

### Impact on RadioNet

The primary goal of the meeting is to provide a platform for the researchers using the RadioNet facility LOFAR for research in the area of cosmic magnetic fields. The format of the meeting was optimized to allow ample discussion time for the newest results, and new approaches in data reduction and analysis. The meeting fostered new and strengthen the existing interaction in the collaboration, and in particular allow young people to establish and strengthen networks and broaden their scientific outlook. A noteworthy aspect was the significant number of Master and Phd students attending (14).

Since LOFAR data reduction and analysis is still not a finalized and stable work flow, like to a large part in cm wavelength radio astronomy, regular discussions and practical workshops (“busy days”) are an integral part of the MKSP meetings. Busy days are an important and established method inside the LOFAR community and especially the MKSP to push LOFAR data quality and therefore scientific output. We had lively discussions, leading to improvements on several aspects of the workflow, especially for establishing RM grids and a significant updating our plans for the reduction and analysis of the first MKSP Deep Field (GOODS-N), which will now be in much closer collaboration with the LOFAR Surveys KSP.

**Important results and contributions** (opinion of the writer of this report)

- Talk by N. Herrera Ruiz on “Polarised Sources in the ELAIS-N1 field” showing polarized sources
- Review by B. Burkhardt on “What Drives Turbulence in Galaxies?” stirred discussions of observational methods
- Talk Torsten Enßlin on “Towards a 3D Galactic magnetic field tomography” showed new methods
- Talk Valentina Vacca on “Observations of filaments of the cosmic web” demonstrated that we are making significant progress on the way to a first detection
- Review by Frits Smeijer on “High Resolution Imaging with LOFAR” showed that we are close to a working pipeline for high resolution LOFAR imaging incorporating the international stations
- Talk by PhD student Ancla Müller on “Magnetic field in the jellyfish galaxy JO206”
- Talk by Krzysztof Chyży on “Are the radio spectra of distant galaxies different?” with new insights on the curvature of radio spectra
- Talk by George Heald on “LOFAR observations of NGC 5775” showing the huge extent of the LOFAR 150 MHz radio halo of this edge-on galaxy

## 2 AGENDA OF THE EVENT

### Monday

12:00-13:00 *Registration*

Introduction (Chair: Dominik Bomans)

- 13:00-13:20 Ralf-Jürgen Dettmar Welcome
- 13:20-13:50 **Tim Shimwell** **The LOFAR Two-metre Sky Survey (LoTSS)**
- 13:50-14:10 Marco Iacobelli LOFAR status update
- 14:10-14:30 George/Cathy MKSP status update
- RM Grid Task Force / Radio Galaxies (Chair: Volker Heesen)
- 14:30-14:45 Shane O'Sullivan Properties of LOFAR polarized sources
- 14:45-15:00 Noelia Herrera Ruiz LOFAR polarisation data of the ELAIS-N1 field
- 15:00-15:30 *Coffee Break*
- 15:30-15:45 Yoshimitsu Miyashita Faraday tomography of radio galaxies at low frequency
- 15:45-16:00 Marek Weżgowiec Multi-frequency analysis of the radio galaxy 4C70.19
- 16:00-16:30 Shane O'Sullivan Discussion / Progress report RM Grid Task Force
- 16:30-17:30 Cathy/George MKSP business meeting

19:00 *Welcome Reception*

### Tuesday

Milky Way / ISM (Chair: Marco Iacobelli)

- 09:00-09:30 **Blakesley Burkhart** **What Drives Turbulence in Galaxies?**
- 09:30-09:45 Charlotte Sobey (Remote) Faraday rotation measures towards pulsars using LOFAR: probing the 3-D Galactic halo magnetic field
- 09:45-10:00 Amit Seta (Remote) Small-scale magnetic fields in the ISM of the spiral galaxies
- 10:00-10:15 Andrew Fletcher The connection between magnetic field strength and gas density in the ISM
- 10:15-10:30 Torsten Enßlin Towards a 3D Galactic magnetic field tomography
- 10:30-11:00 *Coffee Break*
- 11:00-11:15 Sebastian Hutschenreuter The Galactic Faraday depth sky revisited
- 11:15-11:45 Discussion Milky Way (Led by Marco Iacobelli)
- Intergalactic Filaments (Chair: Torsten Enßlin)

- 11:45-12:15 **Klaus Dolag** Turbulence and Magnetic Fields in Cosmological Simulations  
 12:15-12:30 Valentina Vacca Observations of filaments of the cosmic web  
 12:30-13:00 Discussion Intergalactic Filaments (Lead by Torsten Ensslin)  
 13:00-14:00 *Lunch Break*  
 14:00-14:30 Discussion / Plans for busy afternoon  
 14:30-17:30 Busy afternoon (Coffee Break around 16:00)

18:00 *Council reunion*

Krzysztof Chyży

Wednesday

Cosmic rays (Chair: Andrew Fletcher)

- 09:00-09:30 **Julia Tjus** **The role of turbulence modeling for cosmic-ray propagation**  
 09:30-09:45 Volker Heesen Cosmic-ray transport in radio haloes around nearby galaxies  
 09:45-10:00 Shinsuke Ideguchi The potential of Faraday tomography to study supernova remnants using MHD simulation  
 10:00-10:30 Discussion Cosmic Rays (Led by Andrew Fletcher and Volker Heesen)  
 10:30-11:00 *Coffee Break*

Long baselines / Methods (Chair: Björn Adebahr)

- 11:00-11:30 **Frits Sweijen** **High Resolution Imaging with LOFAR**  
 11:30-11:45 Philipp Arras Krzysztof Chyży  
 11:45-12:00 Caterina Tiburzi LOFAR polarization calibration  
 12:00-12:30 Discussion Methods (Led by Caterina Tiburzi and Sarrvesh Sridhar)  
 Case Studies (Chair: Björn Adebahr)  
 12:30-12:45 Haruka Sakemi Polarization Analysis of the SS433 Jet Termination Region  
 12:45-13:00 Ancla Mueller Magnetic field in the jellyfish galaxy JO206  
 13:00-14:00 *Lunch Break*  
 14:00-14:30 Discussion / Plans for busy afternoon  
 14:30-17:30 Busy afternoon (Coffee Break around 16:00)

19:00 *Conference Dinner*

Thursday

Surveys / Deep fields (Chair: Cathy Horellou)

- 09:00-09:30 **Wendy Williams** **LOFAR Surveys Deep Fields: Summary and Update**  
 09:30-09:45 Krzysztof Chyży Are the radio spectra of distant galaxies different?  
 09:45-10:00 Björn Adebahr Apertif - Imaging commissioning and first survey results  
 10:00-10:30 Valentina Vacca Discussion / Progress report GOODS North Task Force  
 10:30-11:00 *Coffee Break*

Nearby Galaxies (Chair: Rosita Paladino)

- 11:00-11:15 George Heald LOFAR observations of NGC 5775  
 11:15-11:30 Dominik Bomans LOFAR observations of extreme starbursts in low mass galaxies  
 11:30-11:45 Sarrvesh Seethapuram Sridhar LOFAR observations of NGC 2403  
 11:45-12:00 Julia Piotrowska LOFAR observations of NGC 6946  
 12:00-12:15 Mami Machida The effect of Faraday depolarization at low frequency verified by the observational visualization of spiral galaxies  
 12:15-12:30 Masaki Suzuki Faraday dispersion function of disk spiral galaxies with global magnetic fields  
 12:30-13:00 Discussion Nearby Galaxies (Lead by Krzysztof Chyży and Volker Heesen)

13:00-14:00 *Lunch Break*  
14:00-14:30 Discussion / Plans for busy afternoon  
14:30-17:30 Busy afternoon (Coffee Break around 16:00)

Friday

09:00-10:30 Busy morning  
10:30-11:00 *Coffee Break*  
11:00-12:00 Summary and Goodbye  
12:00-13:00 Lunch

### 3 PARTICIPANTS

44 participants



**Conference Picture**

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### 4 RADIONET FINANCIAL CONTRIBUTION

*7 speaker/1 participant received travel funding. Total amount of funding 1000€.*

## **5 PUBLICATIONS**

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## **6 CONFIRMATION**

We confirm that RadioNet is allowed to publish this report, incl. participants lists, statistic's details, pictures, etc.