MKSP Status

May 2013

Rainer Beck

MKSP Workshops

1. Kickoff meeting: Bonn 20 Sept 2007
2. Leiden 12 Dec 2007
3. Bonn 23 April 2008
4. Dwingeloo 17 June 2008
5. Hamburg 19 Sept 2008
6. Cambridge 25-26 March 2009
7. Garching 20-21 Oct 2009
8. Dwingeloo 19-20 April 2010
9. Dublin 26-27 Oct 2010
10. Newcastle 5-6 April 2011
11. Bologna 24-25 Nov 2011
12. Gothenburg 29 May – 1 June 2012
13. Sant'Antioco 13-17 May 2013

MKSP members

Total number of members: 87
Total number of countries: 13

Members from institutes in Germany: 39
Netherlands: 13
UK: 11
Poland: 8
Sweden: 5
Italy: 3
France: 2
Others: 6

Management Team (4):

R. Beck (PI), J.A. Anderson (MPIfR Bonn)
G. Heald (ASTRON Dwingeloo), A. Scaife (Univ. Southampton)

Full members (24):

A. Horneffer, J. Köhler, M. Kuniyoshi, D. Mulcahy,
A. Noutsos, W. Reich, C. Sobey (MPIfR Bonn)
R.J. Dettmar, C. Sotomayor (Univ. Bochum)
M. Bell, T. Enßlin, H. Junklewitz (MPA Garching)
A. Bonafede (Univ. Hamburg)
M. Brentjens, G. de Bruyn, R. Pizzo (ASTRON Dwingeloo)
M. Haverkorn, E. Orru (Univ. Nijmegen)
M. Iacobelli (Univ. Leiden)
K. Chyzy, W. Jurusik (Univ. Cracow)
A. Fletcher (Univ. Newcastle)
R. Paladino (IRA Bologna)
C. Horellou (Onsala Radio Obs.)

Associated members (59):

B. Adebahr (Bochum)
P. Alexander (MRAO Cambridge)
G. Arshakian (Univ. Cologne)
N. Ben Bekhti (Univ. Bonn)
G. Bernardi (CfA Cambridge/USA)
M. Birkinshaw (Bristol)
D. Bomans (Bochum)
J. Broderick (Southampton)
M. Brüggen (Hamburg)
T. Carozzi (Onsala Radio Obs.)
E. Carretti (CISRO Sydney)
J. Conway (Onsala Radio Obs.)
R. Drzazga (Cracow)
S. Duscha (ASTRON Dwingeloo)
J. Eislöffel (Tautenburg)
D. Elstner (Potsdam)
J. Farnes (Sydney)
L. Fauvet (ESA Nordwijk)
L. Feretti (IRA Bologna)
K. Ferrière (Toulouse)
J. Geisbüsch (Dominion Radio Obs.)
R. Gießübel (MPIfR Bonn)
D. Green (MRAO Cambridge)
O. Gressel (Stockholm)
V. Heesen (Hertfordshire)
M. Hoeft (Tautenburg)
T. Jaffe (Toulouse)
M. Jamrozy (Cracow)
V. Jelic (ASTRON Dwingeloo)
D. Jones (Nijmegen)
J. Kim (Korea Astr. Inst.)
U. Klein (Univ. Bonn)
M. Kramer (MPIfR Bonn)
M. Krause (MPIfR Bonn)
M. Krause (MPE Garching)
E. Middelberg (Bochum)
H. Miraghaei (Tehran)
A. Miskolczi (Bochum)
B. Nikiel-Wroczynski (Cracow)
K. Otmianowska-Mazur (Cracow)
C. Pfrommer (ITS Heidelberg)
A. Purkayasta (Univ. Bonn)
J. Riley (MRAO Cambridge)
L. Saripalli (Bangalore)
D. Schnitzeler (MPIfR)
C. Shneider (Leiden)
A. Shukurov (Newcastle)
M. Soida (Cracow)
B. Stappers (Manchester)
F. Tabatabaei (MPIA Heidelberg)
K. Takahashi (Kumamoto)
M. Trasatti (Univ. Bonn)
M. Urbanik (Cracow)
V. Vacca (INAF Cagliari)
A. di Vincenzo (Tautenburg)
C. Van Eck (Nijmegen)
W. Vlemmings (Onsala Radio Obs.)
M. Wezgowiec (Bochum)
O. Wucknitz (MPIfR Bonn)

Membership criteria (2013)

Definition of memberships in the LOFAR Magnetism Key Science Project (MKSP) – *version of 12 Feb 2013*

Management Team (MT):

- Represents the major countries involved in the MKSP
- Ensures representation in the LOFAR commissioning and software working groups, in the international committees of LOFAR and in the national LOFAR consortia
- Works on management and progress of the project
- Decides on membership, cooperation, data right and authorship issues
- Holds regular telecons.

Full members:

- Invest at least **20%** (average over ~3 years) of working time for the MKSP, or provide funding for one or more students working at least 50% for the MKSP
- PhD students: invest at least **50%** of working time for the MKSP
- Full members entering at later project stages have to invest more time
- Lead or actively participate in working groups or task groups of the MKSP
- Participate actively in the commissioning and regular observations and data analysis
- Attend workshops and plenary meetings of the MKSP
- Attend LOFAR workshops and Busy Days
- Attend the commissioning and data analysis telecons
- Get access to the LOFAR commissioning data
- Get access to the regular MKSP data
- Have the right to become co-author on refereed papers based on commissioning MKSP data (also after leaving the project)
- Have the right on co-authorship on refereed papers based on full MKSP data (also after leaving the project)
  (The authorships of conference papers will be decided by the first author and the MT.)

Associated members:

- Bring in and share expertise or data of interest for the MKSP
- Participate in working groups or task groups of the MKSP
- Attend workshops and plenary meetings of the MKSP
- Get limited access to commissioning and MKSP data
- Cooperate on individual projects and have the right to become co-author on papers in the case of significant contributions.

MKSP working groups

- Milky Way (Chair: M.Haverkorn)
- Pulsar RMs (Chair: A.Noutsos)
- Nearby galaxies (Chair: C.Chyzy)
- Giant radio galaxies (Chair: G.de Bruyn)
- Intergalactic filaments (Chair: T.Enßlin)
- Polarized stellar and AGN jets (Chair: J.Eislöffel)

MKSP Management Team

5 telecons since May 2012 so far
+ one commissioning meeting
(minutes available on the MKSP WIKI)

Main topics of MT work:

- Commissioning & MSSS
- Membership applications
- Prepare Cycle 0 proposals
- Prepare workshops
- Represent MKSP at KSP-PI meetings
- Represent MKSP in national consortia
- Represent MKSP at international conferences

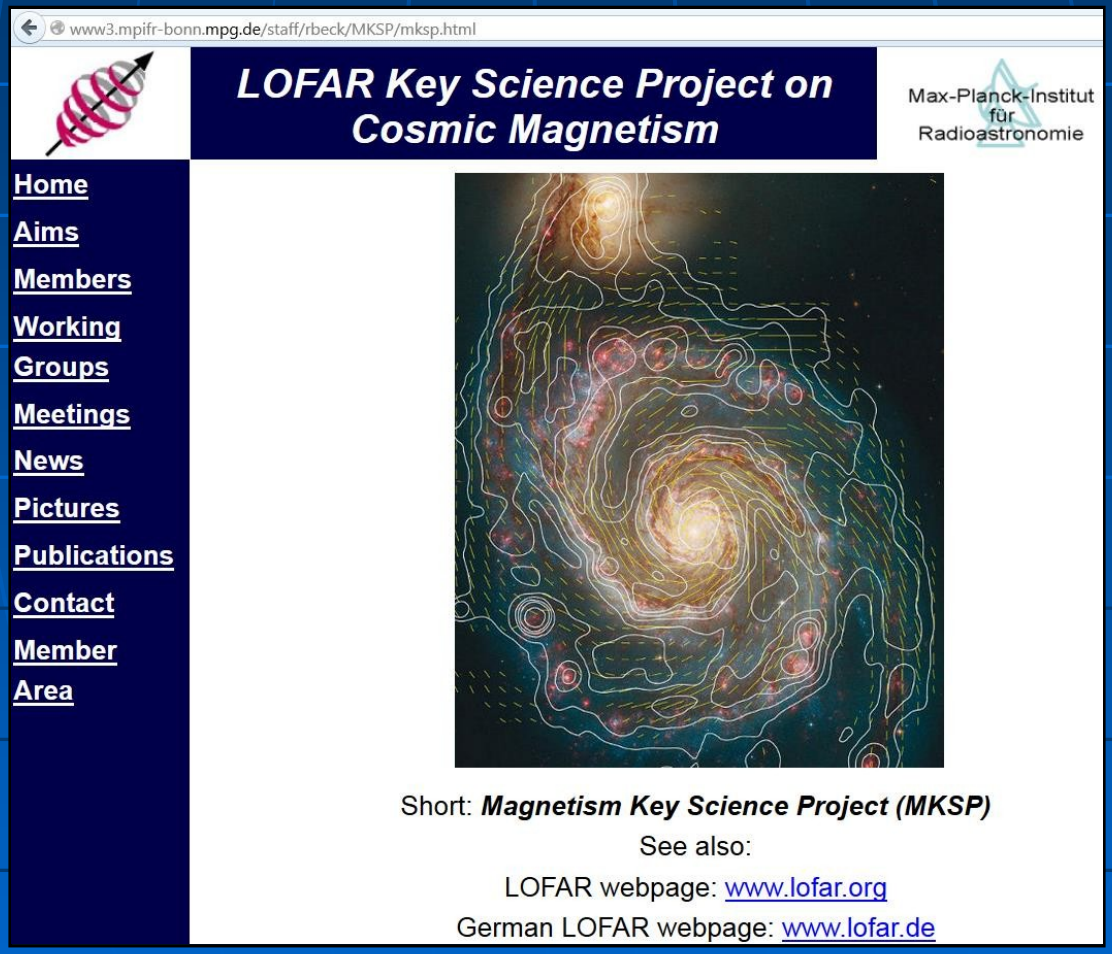
  (IAU Beijing Aug.2012, Hamburg Sept.2012, MRU Bonn Apr.2013)

MKSP webpages (1)

Public webpage:

http://www.mpifr-bonn.mpg.de/staff/rbeck/mksp.html

Basic information, images, member list, news (Webmaster: Rainer Beck)



MKSP webpages (2)

MKSP document server:

http://blogger.astro-rub.de/airubblog

(Webmaster: Enno Middelberg)

General documents, diagrams, documents from workshops, minutes from MT telecons, list of papers and conferences, etc.

LOFAR MSKP WIKI:

http://www.lofar.org/wiki/doku.php?id=science:ksp:magnetism

(Webmaster: Andreas Horneffer)

MKSP on LOFAR User Forum:

http://usg.lofar.org/forum

MKSP observation plan
(needs revision !)

- **Survey of 60 galaxies**
  120-180 & 180-210 MHz, ≈9h per galaxy, together with Surveys KSP
- **Deep galaxy survey**
  ≈10 galaxies, 120-180 MHz, ≈100h per galaxy
- **Milky Way fields**
  piggyback with deep extragalactic fields
- **Radio galaxies**
  ≈10 galaxies, 3 frequency bands, ≈5h per galaxy per band
- **Stellar jets**
  ≈5 objects, 120-180 MHz, ≈20h per object

Cycle 0 proposals related to magnetism

(submitted in Sept. 2012)

MKSP:

- Pulsars: LC0_008 (85h)
- Nearby galaxies/Milky Way/Transients: LC0_043 (112h)
- Large-scale emission from the Milky Way: LC0_044 (288h) (single-station mode)

SKSP:

- AGNs: LC0_012 (210h)
- M81/M82: LC0_026 (16h)
- Clusters: LC0_037 (156h)

Open time:

- Supercluster: LC0_025 (11h)

Assignments of "Reserved Access" observation time for LC0_043 (nearby galaxies)

- GLOW: **79h**
- LOFAR:NL: 0h
- LOFAR:UK: 5h
- LOFAR:Sweden: **28h**
- FLOW: 0h

Total: 112h

Processing time on CEP2: 213.5h
(real processing time will be much larger)

MKSP LC0_043 Cycle 0 observations (nearby galaxies)

Target	Band	Coordinator	Proposed Observer	Actual Observer (1)	Requested Observation Date (2)	Possible Dates (3)	Total Observing Time (4)	Observed / Planned 10.5.2013
M31	HBA (110-190)	Beck	Giessuebel		New Time requested	Oct - Nov	8h	26-Sep
	LBA (30-88)	Beck	Giessuebel			Oct - Nov	8h	27-Sep
M33	HBA (110-190)	Heald	Paladino		New Time requested	Oct	8h	9-Oct
	LBA (30-88)	Heald	Paladino			Oct	8h	10-Oct
M51	HBA (110-190)	Heald	Horneffer	Mulcahy	April 2013	Mar - May	8h	1x8h
M81/M82	HBA (110-190)	Dettmar	Adebahr	Adebahr	February 2013	Dec - Apr	5h + 5h (c)	2x5h
	LBA (30-88)	Dettmar	Adebahr	Adebahr	February 2013	Dec - Apr	5h + 5h (c)	2x5h
NGC891	HBA (110-190)	Beck	Mulcahy		Cycle 1	Oct - Dec	---	
	LBA (30-88)	Beck	Mulcahy			Oct - Dec	---	
~~NGC3079~~	HBA (110-190)	Dettmar	Sotomayor	Sotomayor	~~Mar-Apr 2013~~	Dec - Apr	--- (e)	
	HBA (110-190) d)	Conway	Varenius, Batejat		—	Dec - Apr	---	
NGC4631	HBA (110-190)	Beck	Sotomayor	Sotomayor	Mar-Apr 2013	Mar - Apr	8h	1x8h
NGC6946	HBA (110-190)	Chyzy	Jurusik	Jurusik	August 2013	5h: 10.5. - 10.11. 8h: 1.8. - 20.10.	8h	15-Jul
IC342	HBA (110-190)	Beck	Mulcahy	Mulcahy, Adebahr / v.Eck, Pietka	Feb 2013	8h: 10.9. - 10.2.	5h + 5h (c)	2x5h
	LBA (30-88)	Beck	Mulcahy	Mulcahy, Adebahr	Feb 2013	Oct - Feb	5h + 5h (c)	2x5h
M101	HBA (110-190)	Heald	Toribio	Heald / Toribio	April 2013 (b)	Mar - May	8h	1x8h
NGC3627/3628	HBA (110-190)	Paladino	Drzazga	Paladino	March 2013	max. 5h: now - 10.4.	4h +4h	2x4h
IC10	HBA (110-190)	Scaife	Heesen	Heesen	September 2013	Sep - Nov	8h	25-Aug
	LBA (30-88)	Scaife	Heesen	Heesen	September 2013	Sep - Nov	8h	26-Aug
~~Holmberg 124~~	~~HBA (110-190)~~	~~Chyzy / Bomans~~	~~Nikiel-Wrochzynski~~			~~Dec - Apr~~	—	
Stephans Quintet	HBA (110-190)	Chyzy / Urbanik	Nikiel-Wroczynski	Nikiel-Wroczynski	September 2013	Sep	8h	19-Aug
Milky Way piggy-backs HBA	HBA (110-190)	Haverkorn		Van Eck/Jones				

16 Students + 5 postdocs working on MKSP data

Students and postdocs working with LOFAR MKSP data

Status: 13 May 2013

Institute	Name	Degree	Topic	Importance of LOFAR data
Bochum University	Björn Adebahr	Postdoc	M81/M82 at low ν	crucial
	Arpad Miskolczi	PhD	Edge-on galaxies at low ν	useful
	Carlos Sotomayor	PhD	Ionospheric Faraday rotation	crucial
	NN	PhD	Galaxy spectra at low ν	crucial
MPIfR Bonn	Andreas Horneffer	Postdoc	Spiral galaxies at low ν	crucial
	Rene Gießübel	Postdoc	M31 at low ν	crucial
	Jana Köhler	PhD	Galactic emission at low ν	crucial
	David Mulcahy	PhD	Spiral galaxies at low ν	crucial
	Charlotte Sobey	PhD	Pulsar RMs	crucial
ASTRON	NN	PhD	M101 at low ν	crucial
MPA Garching	Henrik Junklewitz	PhD	Information theory	important
Krakow Univ.	Robert Drzazga	PhD	M81/M82 at low ν	useful
	Wojciech Jurusik	PhD	Galaxy spectra at low ν	crucial
	Blazej Nikiel-Wroczynski	PhD	Compact galaxy groups	crucial
Leiden Univ.	Marco Iacobelli	PhD	Fan region at low ν	crucial
	Carl Shneider	PhD	Turbulent ISM	useful
Nijmegen Univ.	David Jones	Postdoc	Milky Way, IC342	crucial
	Cameron Van Eck	PhD	Milky Way, IC342	crucial
Southampton Univ.	Volker Heesen	Postdoc	IC10 at low ν	crucial
	Chris Riseley *	PhD	Clusters and superclusters	important
Tautenburg Obs.	Alexander Drabent *	PhD	Long baseline calibration	crucial

* : not MKSP member

- LOFAR data are crucial for 11 students + 5 postdocs
- 7 students + 2 (4) postdocs funded by the DFG Research Unit
- 16 MKSP members participated in MSSS data inspection so far

Students working on MKSP data

Remember:

Project abstracts need to be sent to the

LOFAR Publication Committee

lofar-papers@astron.nl

To ensure exclusive rights on the topic !

MKSP: progress

- Extended total emission from nearby galaxies (and clusters) detected
- Extended polarized emission from the Fan region and the region around M51 detected
- Polarized signals and RM from >20 pulsars detected
- Calibration strategy further developed
- Correction of ionospheric Faraday rotation with help of pulsars developed
- First science papers published

MKSP general issues

- Low-noise images still require a lot of handwork
- More experts needed
- Significant software developing still needed, but ASTRON announced to stop development soon
- Polarization calibration still rudimentary
- Original MKSP goals are hard or even impossible to reach

Theoretical LOFAR HBA rms noise

HBA band 120-180 MHz, 200 subbands, effective BW 40 MHz,
40 Dutch stations

1h integration: thermal noise ≈ 0.08 mJy

10h integration: thermal noise ≈ 0.025 mJy

100h integration: thermal noise ≈ 0.008 mJy

Expected intensities of spiral galaxies

150 MHz, 10" beam:

- Inner disk (Stokes I): ≈ 1 mJy/beam
  5σ detection needs 0.2 h (assuming thermal noise)
- Inner disk (Stokes Q+U): ≤ 0.1 mJy/beam (p ≤ 10%)
  5σ detection needs ≥ 16 h
- Outer disk or halo (Stokes I): ≈ 0.1 mJy/beam
  5σ detection needs 16 h
- Outer disk or halo (Stokes Q+U): ≤ 0.03 mJy/beam
  5σ detection needs ≥ 180 h

Goals of the MKSP Project Plan (2009)

- Diffuse total emission (HBA, 10" beam):
  σ ≈ 50 μJy/beam
- Deep mapping of diffuse polarized emission (HBA, 10" beam):
  σ ≈ 10 μJy/beam
- RM grid (HBA, 1" beam):
  σ ≈ 10 μJy/beam

MKSP proposal plan for Cycle 1
(Nov. 2013 – May 2014)

- Continue to survey galaxies ?
- Deep observations of selected galaxies ?
- Pulsars ?

(to be discussed later today)

Goals of this workshop

- Define next commissioning steps
- Define next steps of RM Synthesis pipeline
- Revise MKSP science goals
- Discuss proposals for Cycle 1 (Nov.2013 – May 2014) and establish science teams
- Discuss exploitation of MSSS data
- Prepare further science papers
- Cooperate with POSSUM + MeerKAT teams and with the new SKA Science Magnetism Team

Magnetism Science Working Group Membership

Name	Institution
Melanie Johnston-Hollitt – Co-Chair	Victoria Univ. Wellington
Federica Govoni – Co-Chair	INAF-OA Cagliari
Tobia Carrozzi	
Olaf Wucknitz	MPIfR
Lisa Harvey-Smith	CASS
Bryan Gaensler	Univ. Sydney
George Heald	ASTRON
M. Haverkorn	ASTRON
Anna Scaife	Univ. Southampton
Rainer Beck	MPIfR
Larry Rudnick	U. Minnesota
J. Stil	U. Calgary
K. Takahashi	
Takuya Akahori	Univ. Sydney
Russ Taylor	U. Calgary
Dominic Schnitzeler	MPIfR
Luigina Feretti	INAF-IRA
Katia Ferrière	Observatoire Midi-Pyrenées

Science assessment workshop planned in Jodrell Bank in September 2013

Galactic Magnetism in the Era of LOFAR and SKA

23-27 September 2013 | AlbaNova University Center

Home

AlbaNova Campus, Stockholm, Sweden

Scope

Updated hardware on existing radio telescopes as well as the upcoming generation of telescope arrays like ASKAP, MeerKAT, SKA or LOFAR allow the observer to record a vast number of spectral channels. Applying a Fourier transform to this spectro-polarimetric data of radio continuum emission in turn provides a "Faraday spectrum". This spectral data embodies complex information about the magneto-ionic medium along the line of sight, and within the telescope beam. A reliable detection of three-dimensional magnetic field structures, e.g. in spiral galaxies or galaxy clusters, will require the development of a "Faraday tomography" method based on the analysis of data cubes spanned by two space coordinates and a "Faraday depth" dimension.

Motivation and Outline

Applying new powerful methods based on rotation measure synthesis will require a strong intuition for interpreting the obtained Faraday spectrum. One guiding principle in exploring the range of applicability and limits of the method will be to use simple synthetic data sets. Working with a single line-of-sight towards a background source, we plan to study the signatures created by e.g. multiple Faraday screens. Complications are expected when considering more complex sight lines, e.g. including regions with significant synchrotron emissivity. Further topics will include artificial polarization maps from dynamo simulations, and statistical analysis of data cubes of multi-phase ISM turbulence with realistic cosmic ray energy distributions. Studying these artificial observations, we aim to already shape an image of the new exciting physics to be revealed by upcoming instruments.

Format

The workshop aims to develop essential tools for interpreting polarization data provided by current and future radio telescopes. Specifically addressing the interface between theoretical modelling and observation, we will focus on effective ways to compare observational data with simulation results. To facilitate the exchange of ideas, we plan to have short talks in the morning and hands-on sessions and informal discussions in the afternoon. Registration via the **application page**.

Scientific Organizing Committee

- Sui Ann Mao (NRAO/U of Wisconsin Madison)
- Cathy Horellou (Chalmers Göteborg)
- Oliver Gressel (Nordita Stockholm)
- Bryan Gaensler (The University of Sydney)
- Andrew Fletcher (Newcastle University)
- Axel Brandenburg (Nordita Stockholm)
- Michael Bell (MPIfA Garching)
- Rainer Beck (MPIfR Bonn)


Tenerife, Spain, November 11-22, 2013
COSMIC MAGNETIC FIELDS
THE ELEPHANT IN THE ASTROPHYSICAL ROOM
www.iac.es/winterschool/2013/