



Report from the event supported by RadioNet

TITLE *NEW PERSPECTIVES ON GALACTIC MAGNETISM*

DATE: *JUNE 10 TO JUNE 14, 2019*

LOCATION: *NEWCASTLE UPON TYNE, UK*

MEETING WEBPAGE: <https://conferences.ncl.ac.uk/galacticmagnetism/>

HOST INSTITUTE: *NEWCASTLE UNIVERSITY*

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

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Report:

1 SCIENTIFIC SUMMARY

Rapid improvements in the observing capabilities of radio telescopes and in the physical realism of numerical simulations, as well as growing activities due to the Square Kilometre Array and its pathfinders motivated this meeting on galactic magnetism. The conference provided a platform to facilitate effective communication between observers, theorists and simulators and fostered new collaborations.

Sessions were held on: magnetic fields in and around external galaxies; galactic dynamo theory; the large-scale magnetic field of the Milky Way; broadband polarization observations; small-scale magnetic fields and the interstellar medium; low-frequency polarization observations; cosmic rays, magnetic fields and the ISM; numerical simulations of magnetic field evolution; observations of magnetic fields in high-redshift galaxies; current and future radio polarization surveys. Each session was introduced with an invited talk by a leading expert in the field and was wrapped up with an open discussion of outstanding questions and directions for future research. In total there were 14 invited talks, 30 contributed talks and 21 posters.

Several of the talks and posters reported on recent results obtained from the RadioNet facility LOFAR, concerning new insights in the extent and structure of galactic halos, the distribution of cosmic rays and magnetic fields in the outer regions of galaxies and the properties of polarized radio sources at low frequencies.

Members of the RadioNet community who attended the conference were able to hear from, and discuss with, leading international experts on topics that are directly related to their research, including: the latest developments and applications of the rotation measure synthesis technique for analysing broad-band observations; current theoretical understanding of the role of magnetic fields in the interstellar medium, and their evolution in galaxies; new results from numerical simulations examining the effect of cosmic rays on the interstellar medium; current and planned broad-band radio surveys and new international collaborations to study magnetism.

The conference webpage is:

<https://conferences.ncl.ac.uk/galacticmagnetism/>

2 AGENDA OF THE EVENT

Monday June 10th

11:30-12:50	Registration in Robert Boyle Lecture Theatre	
12:50-13:00	Opening Remarks	Andrew Fletcher, Newcastle University, UK

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13:00-13:30	Magnetic fields in external galaxies	George Heald, CSIRO, Australia
13:30-13:50	The radio continuum view on galactic winds	Volker Heesen, Hamburg University, Germany
13:50-14:10	Magnetic fields in the halo of spiral galaxies seen edge-on – as deduced from CHANG-ES	Marita Krause, MPIfR, Germany
14:10-14:30	Magnetized disk-halo transition region of M51	Maja Kierdorf, MPIfR, Germany
14:30-15:10	Coffee & Posters	
15:10-15:50	Dynamo theory	Kandu Subramanian, IUCAA, India
15:50-16:10	Physical aspects of turbulent dynamos	Anvar Shukurov, Newcastle University, UK
16:10-16:30	Magnetic fields in elliptical galaxies	Amit Seta, ANU, Australia
16:30-16:50	Synthesizing theory and observation to understand galactic magnetic fields	Luke Chamandy, Rochester University, USA
16:50-17:10	Discussion	

Tuesday June 11th

09:00-09:40	Large-scale magnetic fields and the Milky Way ISM	Tess Jaffe, Goddard/Maryland, USA
09:40-10:00	Probing Galactic magnetic field using radio observations of absorbed HII regions	Irene Polderman, Radboud University, The Netherlands
10:00-10:20	Radio broadband Faraday depth grid towards the Milky Way field reversal region	Yik Ki (Jackie) Ma, MPIfR, Germany
10:20-11:00	Coffee & Posters	
11:00-11:40	Galactic Center magnetic fields	Cornelia Lang, Iowa University, USA

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11:40-12:00	High-latitude synchrotron polarization and the local interstellar field	Paddy Leahy, Manchester University, UK
12:00-12:20	Low frequency Faraday rotation measure towards pulsars using LOFAR: probing the 3-D Galactic halo magnetic field	Charlotte Sobey, CSIRO, Australia
12:20-12:40	Discussion	
12:40-14:00	Lunch	
14:00-14:30	Low-frequency polarimetry	Cameron Van Eck, Toronto University, Canada
14:30-14:50	The Global Magneto-Ionic Medium Survey	Tom Landecker, DRAO, Canada
14:50-15:10	Revealing the magneto-ionic structure of the nearby ISM with GMIMS Faraday tomography	Alec Thomson, ANU, Australia
15:10-15:50	Coffee & Posters	
15:50-16:10	Observations of the interaction between HVCs of neutral hydrogen and the Galactic magnetic field	Roland Kothes, DRAO, Canada
16:10-16:30	GMIMS and the Polarization Horizon	Alex Hill, DRAO, Canada
16:30-16:50	Synthetic spectro-polarimetric observations of MHD turbulence in the ISM	Aritra Basu, Bielefeld University, Germany
16:50-17:10	Discussion	

Wednesday June 12th

09:00-09:40	Small-scale magnetic fields and the Milky Way ISM	Marijke Haverkorn, Radboud University, The Netherlands
09:40-10:00	The Zeeman effect as a tracer of magnetic fields in the Milky Way and beyond	Tim Robishaw, DRAO, Canada
10:00-10:20	Linking scales of Galactic magnetism: star forming fields traced by maser Zeeman splitting	Chikaedu Ogbodo, Macquarie University, Australia
10:20-11:00	Coffee & Posters	

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11:00-11:30	Polarized filaments	Vibor Jelic, Ruđer Bošković Institute, Croatia
11:30-11:50	The magnetic interstellar medium in three dimensions	Susan Clark, Institute for Advanced Study, USA
11:50-12:10	Radio Polarimetry and 21 cm HI as a Probe of Galactic Magnetism	Jessica Campbell, Toronto University, Canada
12:10-12:30	Magnetic helicity from the Local Bubble	Katia Ferrière, Observatoire du Midi, France
12:30-12:50	Discussion	
12:50-14:00	Lunch	
14:00-14:20	The LOFAR Magnetism Key Science Project	Cathy Horellou, Onsala Space Observatory, Sweden
14:20-15:00	Broadband polarimetry at m, cm and mm wavelengths	Shane O'Sullivan, Hamburg University, Germany
15:00-19:30	Free afternoon to explore	
19:30-	Conference Dinner: Turknaz in Whitley Bay	

Thursday June 13th

09:00-09:40	Cosmic rays – Propagation	Carmelo Evoli, GSSI, Italy
09:40-10:10	Cosmic ray acceleration & SNR	Tony Bell, Oxford University, UK
10:10-10:50	Coffee & Posters	
10:50-11:30	Dynamo & MHD simulations	Rüdiger Pakmor, MPA, Germany
11:30-11:50	Large-scale dynamos at high magnetic Reynolds numbers and helicity fluxes	Pallavi Bhat, Leeds University, UK

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11:50-12:10	How cosmic rays shape galaxies	Christoph Pfrommer, AIP, Germany
12:10-12:30	Modeling CR electron propagation and synchrotron emission from CR-driven dynamo in spiral galaxies	Michał Hanasz, Nicolaus Copernicus University, Poland
12:30-12:50	Discussion	
12:50-14:00	Lunch	
14:00-14:30	Gamma rays, the ISM & magnetic fields	Isabelle Grenier, Saclay, France
14:30-14:50	The dynamical impact of cosmic rays and magnetic fields in the ISM	Philipp Girichidis, AIP, Germany
14:50-15:10	Simulating galaxy formation with cosmic rays: the multi-frequency view	Maria Werhahn, AIP, Germany
15:10-15:50	Coffee & Posters	
15:50-16:20	Redshift evolution of galactic magnetic fields	Sui Ann Mao, MPIfR, Germany
16:20-16:40	Magnetic fields and dynamo action in evolving galaxies	Luiz Rodrigues, Newcastle University, UK
16:40-17:00	Discussion	

Friday June 14th

09:00-09:40	Polarization Surveys	Bryan Gaensler, Toronto University, Canada
09:40-10:00	Magnetic fields around galactic disks	Dimitry Sokoloff, Moscow University, Russia
10:00-10:20	Detecting the magnetoionized intragroup medium of galaxy group NGC 2563	Anna Williams, Macalester College, USA
10:20-11:00	Coffee & Posters	

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11:00-11:20	FRB as probes of extragalactic magnetic fields	Ryan McKinven, Toronto University, Canada
11:20-11:40	Discussion	
11:40-12:10	Conference Wrap up	Ralf-Jürgen Dettmar, Ruhr University, Germany

Posters

Ariel Amaral, Toronto University, Canada	Using cross-correlation methods to probe large-scale magnetic fields
Prasanta Bera, Southampton University, UK	Dynamo action in dwarf galaxies
Nergis Cesur, Radboud University, The Netherlands	The Magnetic Field Strength in the ζ -Ophiuchi HII Region Sh2-27
Jennifer Chan, UCL, UK	Cosmological polarized radiative transfer as a probe of large-scale magnetic field structures
Can Evirgen, Newcastle University, UK	Magnetic effects on the structure of the interstellar medium
Adriana Gazol, UNAM, Mexico	Geometrical properties of simulated magnetized cold neutral clouds
Fred Gent, Aalto University, Finland	Dynamo driven magnetic fields in the interstellar medium
Gilberto Gomez, UNAM, Mexico	MHD simulations of jellyfish galaxies
Gilberto Gomez, UNAM, Mexico	Magnetic structures in molecular filaments
Sarah Higdon, Georgia Southern University, USA	Magnetic fields in the star forming nuclear ring in NGC 2997
Irina Makarenko, Newcastle University, UK	Comparison of MHD simulations and observations of the Galaxy using topological analysis

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Yoshimitsu Miyashita, Kumamoto University, Japan	Faraday dispersion function of disk galaxies with axisymmetric global magnetic fields II - 3D structure
Mateusz Ogrodnik, Nicolaus Copernicus University, Poland	Implementation of energy dependent transport of cosmic rays in MHD code Piernik
Anna Ordog, Calgary University, Canada	Comparing extended emission and compact source rotation measures to probe the large-scale Galactic magnetic field
Nicolas Peschken, Nicolaus Copernicus University, Poland	Cosmic ray driven winds from magnetized galactic disks
Julia Piotrowska, Jagiellonian University, Krakow	LOFAR Insight into Cosmic Ray Electron Propagation in NGC 6946
Luke Pratley, UCL, UK	Wide-band Rotation Measure Synthesis
Devika Tharakkal, Newcastle University, UK	Random magnetic fields, cosmic rays and synchrotron fluctuations
Marek Wezgowiec, Jagiellonian University, Poland	Can we observe reconnection heating in spiral galaxies
Georg Winner, AIP, Germany	Evolution of cosmic ray electron spectra in magnetohydrodynamical simulations
Dominic Wóltański, Nicolaus Copernicus University, Poland.	Synchrotron emission from a spiral galaxy in the CR-driven dynamo model

3 PARTICIPANTS

70 participants attended, 36% female, covering most European countries and also from Japan, Australia, Mexico, USA and Canada. Over half of the participants were early career researchers (PhD students and post-doctoral researchers). Five of the fourteen invited speakers were female.

4 RADIONET FINANCIAL CONTRIBUTION

The Radionet contribution was used to support the participation of 2 female scientists.

5 PUBLICATIONS

- *In case of future publication - please provide additional information: place & date. Remember to insert the acknowledgment of the RadioNet support:*

The project leading to this publication has received funding from the European Union's Horizon

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2020 research and innovation programme under grant agreement No 730562 [RadioNet]

6 CONFIRMATION:

Following the Regulation (EU) 2016/679 - General Data Protection Regulation-, we ask you to confirm that RadioNet is allowed to publish this report, incl. participants lists, statistic's details, pictures, etc..

I confirm that RadioNet can use this report as above.

Andrew Fletcher
Chair of the Science Organising Committee
School of Mathematics, Statistics and Physics,
Newcastle University

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