

Conference Report: New Perspectives on Galactic Magnetism

10th – 14th June 2019, Newcastle upon Tyne, UK

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Summary and Highlights:

The Conference was a success, well attended by about 61 researchers from all around the world. It composed of a wide range of presentations (talks and posters) on recent advances in cosmic magnetism. There were also stimulating discussion after each session, reviewing current theoretical and observational studies, and identifying essential ingredients needed for deepening our understanding.

While galactic magnetism was the Conference's main theme, the topics covered were not limited to only magnetism in the Milky Way, nearby and extragalactic galaxies. Sciences on sub-galactic scales (e.g. turbulent dynamo, impacts of cosmic rays on interstellar medium) to large-scale magnetism on and beyond galactic scales (e.g. probing intergalactic magnetic fields using backlight illumination, such as by Fast Radio Bursts) were discussed. Updates on the current and future radio surveys were also reported, e.g. LoTSS by LOFAR, VLASS on VLA, CHIME, and POSSUM on ASKAP. The Conference was very informative. I was much benefitted by the platform it provided to learn from leading experts in the field, to gather information on the state-of-the-art theories, simulations, and observations, to interact and discuss with fellow researchers, and to develop new collaboration. The opportunity to present my recent published work on covariant cosmological polarised radiative transfer (CPRT) via poster had also facilitated some fruitful science communication. Specifically, such work provides a solid theoretical foundation of using polarised light to probe the structure of large-scale magnetic fields, accounting for all radiation processes (Faraday rotation and conversion, emission, and absorption), as well as taken into account the general relativistic effects and cosmological effects self-consistently. This provides a reliable means to investigate polarisation signatures imprinted by cosmic plasmas as radiation travels to us. This also enables quantitative assessment of the conditions when standard rotation measure methods will fall short, a subject that has been gaining increasing attention in the community and was much discussed in the Conference.

A key challenge is to interpret the big polarisation data that are becoming available by the current instruments and the next generation radio telescopes, such as the Square Kilometer Array (SKA). This will require joint efforts from both theorists and observers.

More information and the full program of the Conference can be found at <https://conferences.ncl.ac.uk/galacticmagnetism/>.