

Science Goals Align for POSSUM

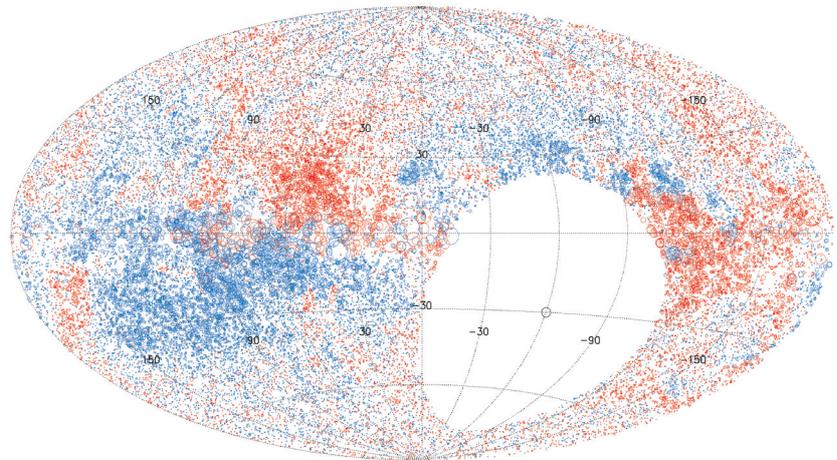
How are large-scale cosmic magnetic fields generated and maintained? That's the central question that the team behind the Polarization Sky Survey of the Universe's Magnetism (POSSUM) project is looking to answer:

The polarisation angle of light emitted by cosmic objects can be altered as the light passes through a region of magnetised gas, an effect known as 'Faraday rotation'.

Led by Bryan Gaensler (University of Sydney, Australia), Russ Taylor (University of Calgary, Canada) and Tom Landecker (Dominion Radio Astrophysical Observatory, Canada), POSSUM will use ASKAP to explore cosmic magnetism by measuring the polarisation of radio signals reaching the telescope.

From Earth the dominant 'foreground' magnetised object is the Milky Way, which fills the entire sky. POSSUM will probe the magnetic field of the Milky Way with over a million lines of sight to polarised background sources. Beyond the Milky Way, ASKAP will allow the POSSUM team to explore the magnetic properties of the extragalactic Universe.

"POSSUM will yield a densely packed grid of millions of Faraday rotation measures over a substantial fraction of the sky," says Bryan Gaensler, whose main



research interest in POSSUM is the use of rotation measures as probes of the Galactic and intergalactic fields, and to study the intrinsic rotation measure properties of active galactic nuclei.

"It will revolutionise our understanding of magnetic fields in the Milky Way, other galaxies and clusters, and in the intergalactic medium."

Russ Taylor is also interested in learning more about the intrinsic properties of active galactic nuclei and galaxies as probes of the evolution of magnetic fields with cosmic history.

"ASKAP will provide a huge step beyond the capability of existing telescopes for this work through its wide field-of-view and its great sensitivity," says Russ.

"We will be able to detect polarised radio emission to most radio-loud active galactic nuclei and radio galaxies in the Universe, as well as from large numbers of galaxy disks out to intermediate redshifts."

> A NRAO Very Large Array Sky Survey image of the sky in polarisation. Credit: Russ Taylor.

"We will also make the first significant steps before the SKA to explore the magnetic properties of galaxies, the role of magnetism in star formation, and the evolution of fields with cosmic time."

POSSUM will allow Tom Landecker to study the polarised emission that is generated by the Milky Way itself in order to shed light on the role of magnetic fields in processes that take place in the interstellar medium.

"Stars in the Milky Way form from interstellar gas enriched by the traces of older generations of stars. New stars impact their surroundings through stellar winds and supernova explosions. We know that magnetic fields play important roles in this Milky Way 'ecosystem' at all stages of these processes, but we know very little about the details. POSSUM will advance us in this quest," says Tom.



> The POSSUM team is made up of Bryan Gaensler, Russ Taylor and Tom Landecker (above left to right), and 52 co-investigators spread across 14 countries. Several postdoctoral fellows and a new PhD student have also recently joined the team. Credits: Mark Sims/Anglo-Australian Observatory, University of Calgary and Dominion Radio Astrophysical Observatory.