

2018 - 2019 ASTROPHYSICS SEMINAR SERIES

Steps to the Polarization Horizon

At meter- and centimeter-wavelengths, the sky is dominated by Galactic synchrotron emission of cosmic rays in the Milky Way's magnetic field. This emission is linearly polarized, but the polarization that we see is heavily influenced by Faraday rotation and depolarization by the intervening ionized medium and the line of sight magnetic field. We can study the distribution of this magneto-ionic medium by Fourier transforming the polarized brightness vs. wavelength-squared to the conjugate variable, rotation measure. This gives us the Faraday spectrum of the polarized brightness. The Faraday spectrum is in many ways analogous to the velocity spectrum of a spectral line; and it can be analyzed with the same tools, in particular the spectral moments.

The Galactic Magneto-Ionic Medium Survey (GMIMS) is the first all sky survey designed to study the Faraday spectrum of the Galactic diffuse synchrotron emission. Various telescopes are being used with broad-band cm-wave and m-wave receivers to generate the data that is needed. Curiously, although the diffuse polarization has been mapped since the 1950s, it was not until GMIMS that it was possible to compute the Faraday spectrum. This revolutionizes our study of the propagation of polarized radiation in the Milky Way, and it may make it possible to better remove the Galactic foreground from future CMB studies. The ultimate goal is to do Faraday tomography, three-dimensional mapping of the magnetic field, cosmic rays, and ionized gas in the Galaxy. But first we must understand where the polarization horizon is.

**Monday, October 15th**

3:30 - 4:30 p.m.

725 Commonwealth Avenue | Room 502

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