

Space Science Seminar
Tuesday, 2015 December 1
10:30 a.m.
NSSTC/1010

**The Solar Corona and Chromosphere with Large
Radio Telescopes**

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Host: Dr. Sabrina Savage

Large radio telescopes (both single dishes and interferometric arrays) can provide very high spectral and temporal resolution, while simultaneously and directly providing full-stokes parameters. In the case of interferometry, high spatial resolution can also be achieved. Often these telescopes are designed for observing non-solar objects such as pulsars and star-forming regions, but with appropriate care can also be used to study the Sun. Solar radio observations are currently under-utilized and can provide unique insights into many long-standing questions in Solar Physics. This seminar will help to illustrate the utility of observing the Sun with modern, state-of-the-art radio observatories.

In this seminar, I will discuss how we are using the 100 m Robert C. Byrd Green Bank Telescope (GBT) to track the Faraday rotation of spacecraft signals (particularly STEREO-A) as they pass behind the Sun. Faraday rotation causes rotation of the linear polarization of the signal, dependent upon the magnitude of the line-of-sight magnetic field and the electron density in the corona. This allows us to observe fluctuations in the magnetic field strength and particle densities on time scales of 0.5-1 s at solar elongations between 1.5 and 30.3 solar radii. Additionally, I will discuss using the Very Large Array (VLA) to study the angular broadening and refraction of quasars illuminating the corona, providing information on the turbulent scales and the orientation of the magnetic field in the outer corona. Finally, the Atacama Large Millimeter Array (ALMA) and GBT soon will be able to directly observe the Sun in optically thick, millimeter- and sub-millimeter wavelengths with high spatial, spectral, and temporal resolution, providing a "linear-thermometer" of the chromosphere and transition region. These observations could potentially provide chromospheric magnetic field measurements in the coming years.

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