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Microwave Imaging Spectroscopy of the Sun with the Expanded Owens Valley Solar Array[1]

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The use of microwave data for extracting physical parameters of the solar atmosphere during both quiescent times and during solar flares relies on a combination of imaging and spectral information. This combination, called microwave imaging spectroscopy, allows the spectral information at each point in the images to be fit based on the spectral dependence of the emission on source magnetic field strength and direction, number and energy distribution of accelerated electrons, and temperature and density of the ambient solar corona. From such fits, these parameters can thus be deduced as a function of position in the field of view. Although the power of this approach has been appreciated for many years, the instrumentation required to provide the needed combination of imaging and spectral information has been largely lacking. This has changed with the recent completion of NJIT's Expanded Owens Valley Solar Array (EOVSA), which is the first interferometry array with the ability to provide high-quality images at hundreds of frequencies over a broad microwave spectral range (2.5-18 GHz). This talk describes the microwave imaging spectroscopy results from some of the first EOVSA observations of solar flares and active regions, as well as on-going efforts to use the measured parameters as input to a complete, three-dimensional model of flaring loops.

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