

The Frequency Agile Solar Radiotelescope

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The Frequency Agile Solar Radiotelescope (FASR) is a priority solar-dedicated radio telescope slated for construction starting in 2009. The instrument will exploit ultra-broadband imaging spectroscopy to address an extremely broad range of solar and space weather science, including routine measurement of coronal magnetic fields, imaging coronal mass ejections near the solar surface, quantitative diagnostics of energy release and particle acceleration in flares, and the extension of the solar corona into the heliosphere. In particular, FASR will observe a radio frequency range of 50 MHz to 21 GHz. It will do so with three distinct arrays of antennas/stations, each of which will observe roughly a decade of bandwidth. The instrument will sweep the entire frequency range once every second, imaging the RF band with a spectral resolution of 1% and an angular resolution of 1" at a frequency of 20 GHz. Moreover, FASR will provide dual-circular polarization measurements. A single correlator will support the three arrays of antennas. Operationally, the instrument will perform "monomode" observing and, as such, operate as a data machine. This paper describes the science objectives of the instrument, and provides an overview its specifications and its design. The innovative aspects of the FASR design are highlighted. These include ultra-broadband feeds; ultra-broadband analog data transmission; digital implementations of delay corrections, fringe rotation, and RFI mitigation; the use of a digital hybrid to convert from native linear to dual circular polarization channels; pipeline data processing. The current status of the project will be described briefly, including organization and site.