LOW FREQUENCY SOLAR PHYSICS WITH THE FREQUENCY AGILE SOLAR RADIOTELESCOPE

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The Frequency Agile Solar Radiotelescope (FASR) is an instrument designed to perform broadband imaging spectroscopy of the Sun over a frequency range of roughly 30 MHz to 30 GHz. It will do so with angular, spectral, and temporal resolutions commensurate with physical processes that occur on the Sun. As such, FASR will address an extremely broad program of solar physics. The key science goals of FASR include 1) coronal magnetic fields; 2) energy release in flares; 3) drivers of space weather; 4) the thermal Sun. In this talk, low frequency radiophysics and its relevance to drivers of space weather will be emphasized, which includes radio diagnostics of the nature and origin of coronal mass ejections, formation and propagation of coronal shocks, and the origin or solar energetic particles.

FASR will comprise three antenna arrays, each designed to cover roughly a decade in bandwidth. FASR A will observe in centimeter wavelengths, FASR B in decimeter wavelengths, and FASR C in meter wavelengths. Antennas in FASR A and B will be steerable paraboloids while FASR C will be composed of fixed broadband elements. The antenna configuration in each array will be optimised to produce high fidelity snapshot imaging over the entire frequency range.

This talk will summarize the specifications of each array and the design approach to the instrument. The fact that FASR is a solar-dedicated instrument eliminates the need for large antennas, cooled front ends, and a large correlator. Yet FASR nevertheless raises interesting design challenges, including the need for low-cost, robust antennas, operations in the presence of a variety of RFI sources, and the need for an extremely stable instrument.

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