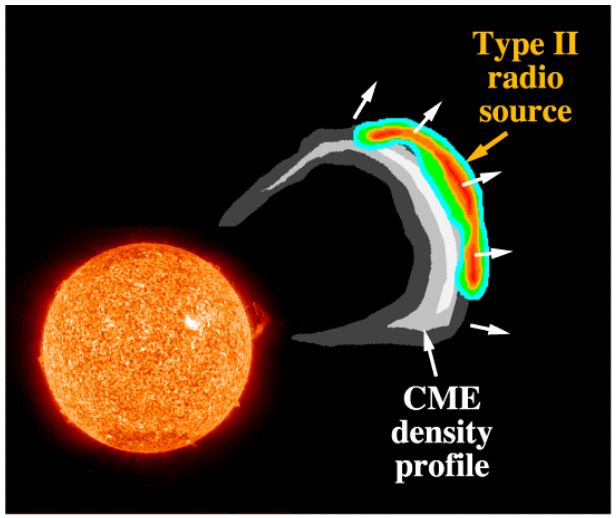
Solar Imaging Radio Array (SIRA)



Two dimensional radio imaging of the CME-driven shock front and the CME density profile is critical for predicting the space weather effects of CMEs

Technology Requirements:
- Microsat deployment and station keeping
- Intermicrosat ranging (to ~3 m)
- "Full-sky" aperture synthesis mapping algorithm development
- Onboard data cross-correlation desirable

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Fundamental Question:
- What is the global structure of individual CMEs and other large features in the outer corona and inner heliosphere and how do they propagate and evolve?

This question is important because an improved scientific understanding of these objects is critical for space weather prediction. Low-frequency radio imaging and tracking of CMEs and flare-initiated solar radio bursts will significantly improve the accuracy of space weather forecasting, in large part because it can provide images at all distances from the Sun to 1 AU.

Science Objectives:
- Understand CME structure, propagation, and evolution from the Sun to 1 AU
- Apply solar radio burst images to mapping of solar wind density structures and magnetic field topology, providing a unique tool for solar wind analysis
- Enhance space weather prediction capabilities using radio images of CMEs
- Observe and analyze the global response of Earth's magnetosphere to CMEs and other space-weather-effective events from an exterior perspective
- Image the low-frequency (< 30 MHz) radio universe at high angular resolution and catalog and understand the objects found therein

Mission Description:
- Microsat constellation of 10 – 16 identical spacecraft
- Crossed dipole antennas and low frequency radio receivers
- Quasi-spherical constellation with <100 km diameter
- Nearly circular distant retrograde orbit (~10^6 km from Earth)
- Individual microsat communication with ground stations

Measurement Strategies:
- High spatial and temporal resolution
- Frequency range from ~30 MHz to ~30 kHz
- Frequency spacing and time resolution optimized for solar burst analysis
- Rapid data processing for space weather prediction