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A Fast Neutron Imager for Inner Heliosphere Measurements

JAMES RYAN, JOHN MACRI, MARK MCCONNELL, University of New Hampshire, MICHAEL MOSER, University of Bern, ROBERT LIN, University of California Berkeley — Inner heliosphere measurements of the Sun can be conducted with the proposed Solar Sentinel spacecraft and mission. One of the key measurements that can be made inside the orbit of Earth is that of lower energy neutrons that arise in flares from nuclear reactions. Solar flare neutrons below 10 MeV suffer heavy weak-decay losses before reaching 1 AU. For heliocentric radii as close as 0.3 AU, the number of surviving neutrons from a solar event is dramatically greater. Neutrons from 1-10 MeV provide a new measure of heavy ion interactions at low energies, where the vast majority of the energetic particle energy resides. Such measurements are difficult because of locally generated neutrons. We describe the potential of such neutron measurements in the context of the Solar Sentinel program and an instrument for performing these measurements employing neutron imaging techniques to optimize the signal-to-noise ratio.

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