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Poster

In solar and helio-physics, the coronal heating problem relates to the question of identifying and explaining the mechanism(s) causing the corona's temperatures to be a few hundred times hotter than the solar surface. Among the various plausible hypotheses proposed to explain this problem, one of the strongest candidates relates to

copious low energy magnetic reconnections (nanoflares) occurring throughout the solar corona. When examined thoroughly, this mechanism implies heating that happens impulsively on individual flux tubes (strands). Emission of hard X-rays (HXR) should be a consequence of such non-thermal phenomena, or even of purely thermal transients, if hot enough. In quiescent solar corona areas, nanoflares should manifest in HXR via very faint signatures covering vast regions. Observing feeble HXR demands an instrument with high sensitivity and dynamic range for energies between 4 and 15 keV. FOXSI (which stands for the Focusing Optics X-ray Solar Imager) is such an instrument. As a payload of a NASA/LCAS (low-cost access to space program) sounding rocket, FOXSI has successfully completed three launches. The two most recent flights (FOXSI-2 and -3) included quiescent areas of the Sun as part of the targets. For this presentation, we will show a full assessment of the HXR flux from the quiet Sun observed with FOXSI. We begin by presenting a thorough characterization of the stray light (ghost rays) impinging into FOXSI's detectors caused by sources outside of the field of view. We then identify areas free of ghost rays where the instrument sensitivity reaches a maximum to quiet Sun HXR detections. Finally, we implement a Bayesian (known as ON/OFF analysis) to estimate an upper detectability threshold of quiet Sun HXR and a probability distribution for quiet-Sun HXR fluxes when sources are supposed to exist.

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