

NuSTAR's First Solar Observations: Search for a high energy X-ray component to the "non-flaring" Sun

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We present spectroscopy of the Sun with the NuSTAR hard X-ray (HXR) telescope, searching for high temperature and non-thermal emission in the "non-flaring" Sun. A substantial amount of flare energy goes into accelerating electrons. HXR observations are a crucial tool for understanding this non-thermal emission and the energy release in flares. RHESSI is able to study this emission over many orders of magnitude (active region flares from X-class to A-class microflares), but it cannot detect the emission from smaller events. Such "nanoflares" have been postulated as a possible source of coronal heating and their existence and relationship to larger flares is still uncertain. In order to detect these events in HXR, instruments more sensitive than RHESSI are required. Launched in 2012, the astrophysics mission NuSTAR uses focusing optics to directly image X-rays between ~2-80 keV. Although not optimized for solar observations, NuSTAR's highly sensitive imaging spectroscopy will be used to search for the faintest X-ray emission from the Sun. These solar observations will begin in September 2014. Here we present the first results of our search for transient brightenings in active and quiet Sun regions with NuSTAR.