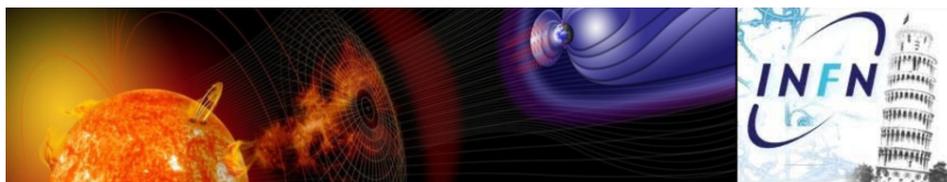


RHESSI-20 Workshop: Preparing for the Next Decade in High-Energy Solar Physics Research



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Plasma Diagnostics of Microflares observed by STIX and AIA

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Solar flares are generally thought to be the impulsive release of magnetic energy giving rise to a wide range of solar phenomena that influence the heliosphere and in some cases even conditions of earth. Part of this liberated energy is used for particle acceleration and to heat up the solar plasma. The Spectrometer/Telescope for Imaging X-rays (STIX) instrument onboard the Solar Orbiter mission launched on February 10th 2020 promises advances in the study of solar flares of various sizes. It is capable of measuring X-ray spectra from 4 to 150 keV with 1 keV resolution binned into 32 energy bins before downlinking. With this energy range and sensitivity, STIX is capable of sampling thermal plasma with temperatures of ≈ 10 MK, and to diagnose the nonthermal bremsstrahlung emission of flare accelerated electrons. During the spacecraft commissioning phase in the first half of the year 2020, STIX observed 68 microflares. Of this set, 26 events could clearly be identified in at least two energy channels, all of which originated in an active region that was also visible from earth. These events provided a great opportunity to combine the STIX observations with the multi-band EUV imagery from the Atmospheric Imaging Assembly (AIA) instrument on board the earth orbiting Solar Dynamics Observatory (SDO). For two of the largest events (GOES class B6 and B2), it was possible to perform a spectroscopic analysis and to fit the spectra assuming thermal and nonthermal sources. These results are combined with plasma diagnostics derived from AIA EUV images. To this aim, the Differential Emission Measure (DEM) was reconstructed from AIA observations to infer plasma temperatures and EM in the flaring regions. This allows us to supplement the information gained with STIX with high spatial resolution diagnostics of thermal plasma from the DEM reconstructed from AIA data.

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