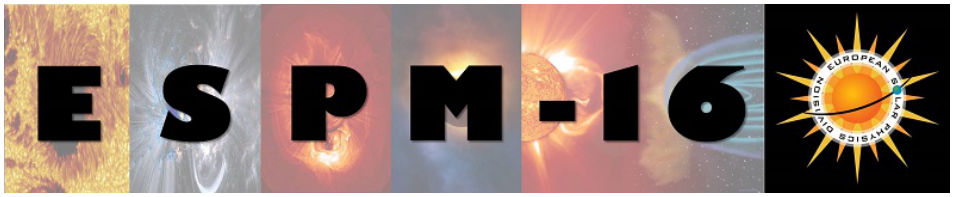

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Early results of the image reconstruction problem from STIX data

Wednesday, 8 September 2021 14:52 (13 minutes)

The Spectrometer/Telescope for Imaging X-rays (STIX) is a remote sensing instrument on-board the Solar Orbiter mission, conceived for the measurement of hard X-ray photons emitted by thermal and non-thermal mechanisms during solar flares. In particular, the scientific goal of STIX is to provide information on location, timing and spectrum of the accelerated electrons at the Sun. The STIX imaging concept is based on the Moire pattern technique that allows the measurement of 30 *visibilities*, i.e. Fourier components of the photon flux emitted during a solar flare. Hence, the imaging problem from STIX data is the one of reconstructing the flaring source by inverting a sparse sampling of its angular Fourier transform. In this talk we show the results obtained with several imaging techniques when applied to semi-calibrated or fully calibrated STIX visibilities. Specifically, we show the ability of Particle Swarm Optimization and Sequential Monte Carlo to solve a parametric imaging problem from visibility amplitudes alone, also giving quantitative estimates of the uncertainty of the reconstructed parameters. Moreover, we provide some insights about the calibration of the visibility phases and how imaging techniques can support the calibration process. Finally, we show the performances of maximum entropy and interpolation methods when applied to fully calibrated data. For assessing the validity of our results, we compare them to higher-resolution maps obtained by the Extreme Ultraviolet Imager (EUI) within Solar Orbiter, and the Atmospheric Imaging Assembly onboard the Solar Dynamics Observatory (SDO/AIA).

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