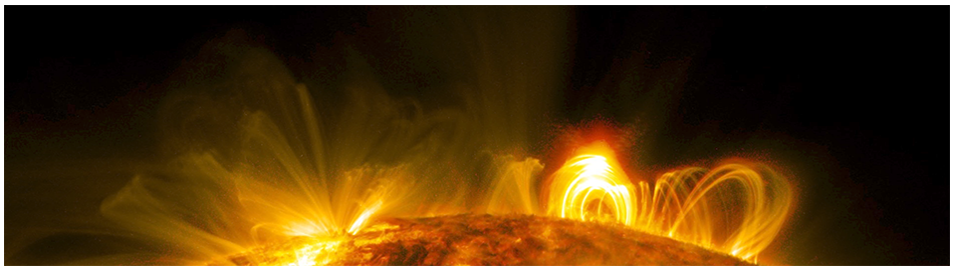

Contribution ID: **38** Type: **Invited talk**

Solar Spectroscopy in X-rays and EUV, and Future Prospects

Wednesday 17 November 2021 12:00 (30 minutes)

Solar flares are the most powerful explosions in the solar system, impulsively releasing stored magnetic energy to heat coronal plasma to tens of MK and accelerating electrons to hundreds of MeV and ions to tens of GeV. Even within quiescent (non-flaring) active regions, ambient plasma is impulsively heated to 5-10 MK, well above the "quiet corona" temperatures of 1-3 MK. Despite many decades of study, the fundamental question of how magnetic energy is stored in the corona and impulsively released to drive these processes remains open. Spectroscopic observations of the Sun offer unique probes into energy release processes. X-ray and extreme ultraviolet (EUV) wavelengths, in particular, provide critical diagnostics of plasma temperatures, densities, and elemental abundances, as well as accelerated electron populations and associated energy deposition. Measurements of these various properties and their evolution over time provide insight into the underlying physical mechanisms of plasma heating and particle acceleration. Each wavelength range offers unique access to specific processes and/or temperature regimes, and combined observations enable a comprehensive picture of impulsive energy release in solar flares and within quiescent active regions. A number of recent and ongoing missions have made significant advancements in answering this question, including with spatially integrated spectroscopy, filtergram imaging, and spectral imaging in X-rays and EUV using various techniques. We provide a brief review of some of these missions and their contributions to the field, including RHESSI, SDO (EVE and AIA), Hinode (XRT and EIS), and MinXSS. We then discuss upcoming missions that will break new ground with novel observations, including the IMPRESS and CubIXSS CubeSats. We close with a long-term outlook for making transformative progress on this question, including the COMPLETE mission concept that aims to finally close this longstanding and fundamental question.

Primary author: CASPI, Amir (Southwest Research Institute)

Co-authors: THE MINXSS TEAM; THE IMPRESS TEAM; THE CUBIXSS TEAM; THE COMPLETE TEAM

Presenter: CASPI, Amir (Southwest Research Institute)

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