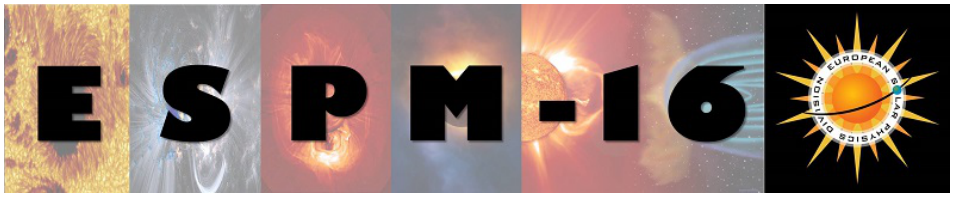

Contribution ID: **215** Type: **Poster**

The Evolution of Plasma Composition During a Solar Flare

Wednesday, 8 September 2021 16:56 (13 minutes)

We analyze the coronal elemental abundances during a small flare using Hinode/EIS observations. Compared to the preflare elemental abundances, we observed a strong increase in coronal abundance of Ca xiv 193.84 Å, an emission line with low first ionization potential (FIP < 10 eV), as quantified by the ratio Ca/Ar during the flare. This is in contrast to the unchanged abundance ratio observed using Si x 258.38 Å/S x 264.23 Å. We propose two different mechanisms to explain the different composition results. First, the small flare-induced heating could have ionized S, but not the noble gas Ar, so that the flare-driven Alfvén waves brought up Si, S, and Ca in tandem via the ponderomotive force which acts on ions. Second, the location of the flare in strong magnetic fields between two sunspots may suggest fractionation occurred in the low chromosphere, where the background gas is neutral H. In this region, high-FIP S could behave more like a low-FIP than a high-FIP element. The physical interpretations proposed generate new insights into the evolution of plasma abundances in the solar atmosphere during flaring, and suggests that current models must be updated to reflect dynamic rather than just static scenarios.

Primary author: TO, Andy S.H. (Mullard Space Science Laboratory, UCL)

Co-authors: BAKER, Deborah (UCL/MSSL); Dr LONG, David M. (Mullard Space Science Laboratory, University College London, UK); Prof. VAN DRIEL-GESZTELYI, Lidia (UCL/MSSL); Dr VALORI, Gherardo (MPS); Dr BROOKS, David H. (George Mason University); LAMING, J. Martin (Naval Research Laboratory)

Presenter: TO, Andy S.H. (Mullard Space Science Laboratory, UCL)

Session Classification: Poster Session 8.3

Track Classification: Session 3 - Fundamental Plasma Processes in the Solar Atmosphere: Magnetic Reconnection, Waves, Emission, Particle Acceleration