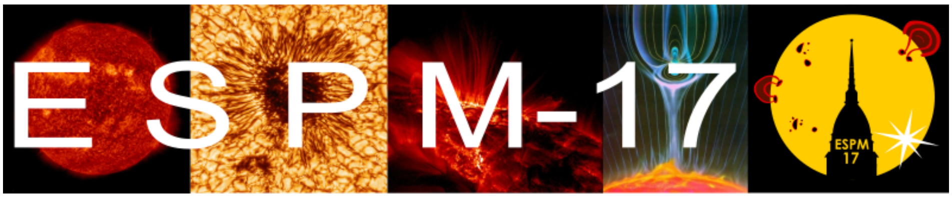

Contribution ID: **253** Type: **Poster**

Investigating the Effects of Background Subtraction on a Dust-Free Corona

The elusive solar corona, when observed in white light, presents contributions from two main components of scattered photospheric light: the K-corona, due to electrons, and the F-corona, due to dust. While the K-corona corresponds to the “true corona” and displays structuring in the form of helmet streamers, pseudostreamers, coronal holes, and plumes, the diffuse F-corona dominates the measured intensity especially at altitudes $>4R_{\odot}$. For this reason, background-subtraction techniques have been developed to remove the dust contribution to coronagraph imagery and to reveal the electron corona. However, it is not possible to validate the efficacy of such methods against a “ground truth”, hence it is generally unknown how much of the K-corona effectively leaks into the generated backgrounds. In this work, we use a 32-day-long simulation ran with the Magnetohydrodynamic Algorithm outside a Sphere (MAS) code and based on a novel near-real-time, data-assimilative, time-evolving model to investigate for the first time the impact of background subtraction on the structure of the solar corona inferred from white-light imagery. Since the synthetic observables employed here do not suffer from the presence of dust or instrumental scattered light usually exhibited in coronagraphs, we are able to quantify our results against a “true” K-corona. We explore different methods and time-windows to generate a set of synthetic backgrounds to examine the consequences of these choices on the overall appearance of the electron corona and the relative brightness of background-subtracted structures compared to their ground truth as well as the full 3D density of the global corona.

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Session Classification: Coffee break and poster session 1

Track Classification: Energy and mass transfer throughout the solar atmosphere and structures within