Modelling the EUV coronagraphic observations of the Full Sun Imager on board Solar Orbiter

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Résumé

Because of its mass and abundance, helium plays a fundamental role in the dynamics of the solar wind. The properties of helium are characterized in the photosphere with spectroscopic surveys and in the heliosphere with in-situ measurement thanks to previous space mission. However, very few measurements of the helium abundance exist in the corona above 1.1Rs where the solar wind is accelerated. The EUI and Metis instruments on board Solar Orbiter can map the spatial distribution of helium abundance from 1.5Rs to 7Rs by simultaneously observing the Lyman alpha lines of H0 et He+. These measurements will help constrain models of solar wind acceleration in the solar corona. We need a comprehensive model of the coronal emission in the passband of each instrument in order to estimate helium abundance from EUI and Metis. In this work, we focus on modelling the EUV observations of the Full Sun Imager (FSI) from EUI in its two narrow passbands: the 304A Lyman alpha line of He+ and the 174A line of Fe9+. We built a state of art model of EUV emission lines to simulate the stray light-free images provided by the coronagraph mode of FSI. This allows us to quantify the relative contributions of the collisional excitation and photo-excitation processes. We present comparisons between FSI observations and MHD-based forward modelling.

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