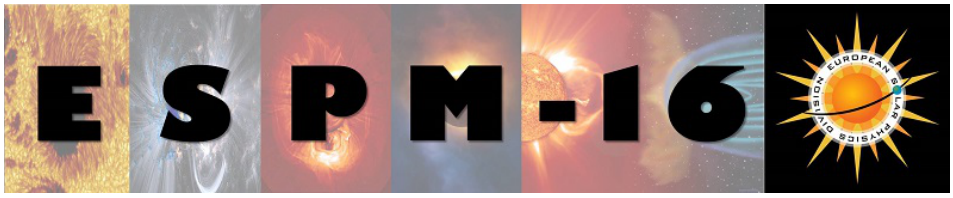

Contribution ID: **390** Type: **Poster**

Planning Solar Corona Tomography with SolO/Metis

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

The Metis coronagraph, on board the Solar Orbiter (SolO) mission, records full-Sun images of the solar corona in ultraviolet and in polarized visible brightness (pB). The range of heliocentric heights covered by the field of view (FoV) of Metis changes as a function of the SolO position along its highly eccentric orbit. For its maximum aphelion distance ($\approx$ 1 au) the radial FoV of Metis is $\approx 5.8 - 10.2$ $R_\odot$, while for its minimum perihelion distance (≈ 0.3 au) it is $\approx 1.7 - 3.1$ $R_\odot$. Also, as the angular velocity of SolO around the Sun changes along its orbit, so it does the time required to observe the Sun from different view angles. In this work, we explore the use of Metis pB images for tomographic reconstruction of the three-dimensional (3D) distribution of the coronal electron density. Using the predictive orbital information of SolO and the specifications of the Metis instrument, we compute synthetic images of the solar corona based on a 3D MHD steady state coronal model. We use these images as data for tomographic reconstructions. We carry out these simulations for an aphelion and a perihelion location. We conclude that a ~ 4 image/day synoptic program will provide enough images to carry out tomography with Metis images at any point of the SolO orbit. We discuss in detail what region of the solar corona can be reconstructed as a function of the orbital location.

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Session Classification: Poster Session 7.1

Track Classification: Session 2 - The Solar Atmosphere: Heating, Dynamics and Coupling