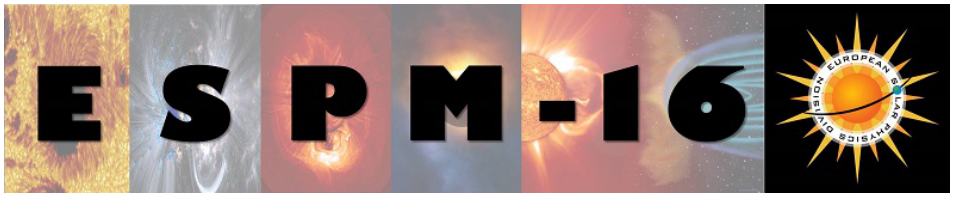

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Study of the striae in the tail of Comet Lovejoy as a diagnostic tool for coronal density

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The passage of comets in the solar corona can be a powerful tool to probe the local plasma properties. One such case is offered by Comet Lovejoy, which gives us the possibility to infer the coronal plasma density along the magnetic field lines intersected by the comet trajectory, thanks to the emission by cometary ions injected along the magnetic field, forming so-called striae.

Here, we carry out a preliminary study of these striae, as observed by the Atmospheric Imaging Assembly (AIA) aboard the Solar Dynamics Observatory (SDO) during the ingress phase of the comet orbit. We consider the images in the 171 Å line, where emission from oxygen ions O^{4+} and O^{5+} is found.

The striae are described as due to the beam of oxygen ions along the local magnetic field, with the injection beam velocity decaying because of collisions. Also, ion collisional diffusion contributes to ion propagation. Both the collision time for velocity decay and the diffusion coefficient depend on the ambient plasma density so that measurements of the striae length can be related to the local density. A probabilistic description of the ion beam density along the magnetic field is developed, where the beam position is given by the velocity decay and the spreading of diffusing ions is described by a Gaussian probability distribution. Profiles of emission intensity along the magnetic field are computed and compared with the profiles along the striae observed by AIA, in order to estimate the ambient plasma density.

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