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First Metis Detection of the Helium D3 Line Polarisation in a Large Eruptive Prominence

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Metis on board of Solar Orbiter is the space coronagraph developed by an Italian-German-Czech consortium. It is capable of observing solar corona and various coronal structures in the visible-light (VL) and UV (hydrogen Lyman α) channels simultaneously for the first time. Here we present observations of a large eruptive prominence of April 25-26, 2021,
in the VL, taken during the mission cruise phase, and demonstrate that apart from the broad-band continuum emission which is due to the Thomson scattering on prominence electrons we detect a significant radiation in the neutral-helium D_3 line (587.6 nm) which lies within the Metis VL passband. We show how the prominence looks like in the Stokes I, Q, and U. We consider two extreme cases of the prominence magnetic field, and we separate the Stokes I and Q signals pertinent to Thomson scattering and to the D_3 line.

The degree of linear polarisation of the D_3 line (both Q and U) indicates the presence of the prominence magnetic field, hence Metis can serve as a magnetograph for eruptive prominences located high in the corona.

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