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Early Observations from the Solar Orbiter SWA/Electron Analyser System

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Solar Orbiter carries a total of 10 instrument suites making up the payload for the mission. One of these, the Solar Wind Analyser (SWA) instrument, is comprised of 3 sensor units which are together served by a central DPU unit. Of particular focus in this presentation are the early measurements from one of these sensors, the Electron Analyser System (EAS). EAS is a dual-head, top-hat electrostatic analyser system that is capable of making 3D measurements of solar wind electrons at energies below ~5 keV from a vantage point at the end of a 4-metre boom extending into the shadow of the spacecraft. The sensor was accommodated in this location to both maximise the unobstructed field of view and to minimise the effect of spacecraft related disturbances on the low-energy (less than a few tens of eV) electrons expected the core population of the solar wind.

To date the SWA instrument sensors have operated sporadically during the mission cruise phase, which began in June 2020. This is due to a number of operational issues faced by the SWA team, which mean we have not been able to take data in a continuous manner. However, the data that has been taken shows the clear promise of the SWA measurements, in general, once these issues can be overcome. For example, EAS is using a novel sample steering mechanism in burst mode which, with reference to a magnetic field vector shared onboard by the MAG instrument, allows the capture of the electron pitch angle distribution at unusually high time resolution. We discuss these observations here, and illustrate the potential science returns from the burst mode. We also present results from the new EAS observations in the vicinity of reconnecting current sheets in the solar wind, to more generally illustrate the capability of the sensor.

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