



## **Moments of the electron velocity distribution from Cluster-PEACE: how good are they?**

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It is generally speaking considered to be more difficult to produce accurate moments of the plasma electron velocity distribution than for the ions, in measurements of space plasmas. For example, ion plasma flow speeds are generally large compared to the ion thermal motions, whereas the electron bulk speeds are often comparable to electron thermal speeds, making the electron bulk flow speed more difficult to resolve. Spacecraft potential effects are often more significant for electron measurements than ions, and contamination of plasma measurements by spacecraft electrons may also cause difficulties.

The Cluster mission provides an opportunity to see how well electron moments can be determined, under relatively favourable spacecraft accommodation conditions, with data from the PEACE electron instruments. The Cluster spacecraft are carefully designed to have minimal adverse impact on the measurement of low energy plasmas, having a uniformly conductive surface and a spacecraft potential control device which was used part of the time. The spacecraft also carry ion instruments, as well as electric and magnetic field experiments, able to provide references for bulk flow velocity. Similarly, the spacecraft carry plasma wave instruments able, in some situations, to provide good total electron density measurements. All these supporting data enable us to optimise calibrations of the electron instruments, and also to make moments calculations in which the most common problems are properly resolved (spacecraft potential effects and spacecraft electrons). We will discuss moments determination from 3D data, in different magnetospheric regions and the solar wind, and demonstrate the level of accuracy that can be attained.