



Ion acceleration up to supra-thermal energies due to wave-particle interactions in the cusp region. A CLUSTER case study.

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The purpose of our analysis is to determine the way ions are accelerated up to supra-thermal energies in the cusp diamagnetic cavities. For that reason we have investigated a number of CLUSTER cusp crossings for the years 2001 and 2002 using data from RAPID, STAFF, CIS and PEACE experiments. From all the cusp events we went through in our analysis we focus on a particular one on March 25, 2002 which demonstrates in a clear way the general characteristics of the events in our survey. This event exhibits very sharp spatial boundaries seen both in CNO (primarily single-charged oxygen of ionospheric origin based on CIS observations) and H^+ flux increases with the magnetic field intensity being anti-correlated. Unlike ions, electrons show negligible flux increase. The fact that the duskward electric field E_y has relatively low values $<5\text{mV/m}$ while the local wave activity is very intense provides a strong indication that ion energization is caused primarily by wave-particle interactions. The wave power spectrum during this cusp event is examined in detail. It is concluded that the high ion fluxes and at the same time the lack of any sign of activity in the electrons clearly shows that the particle acceleration depends on the wave power density at the local particle gyrofrequency.