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Acceleration and Escape processes of Planetary Ions at the Venus Nightside

C. FERRIER (1), A. FEDOROV (1), J.A. SAUVAUD (1), T.L. ZHANG (2), and S. BARABASH (3)

(1) CESR, Systeme Solaire, Toulouse, France (ferrier@cesr.fr), (2) SRIAAS, OEAW, Graz, Austria (Tielong.Zhang@oeaw.ac.at), (3) SISP, Kiruna, Sweden (stas@irf.se)

The plasma wake of Venus is filled by ions of planetary origin. Recent measurements on the Ion Mass Analyser (IMA) onboard Venus Express show that acceleration of these ions depends on their spatial position in the tail. We found that the tail cross-section can be divided into 2 principal regions : A) the plasma sheet ; B) a ring region around the plasma sheet.

Ions observed in the plasma sheet (mostly O+) are accelerated in energy range from 100eV to 1000eV by J*B forces known also as slingshot effect. But particles in the ring (H+ and O+) are accelerated by a completely different mechanism similar to process of acceleration of polar wind in the terrestrial magnetosphere. In the last case ions are accelerated by pressure gradients and by the tendency for electrons to escape from the top of the ionosphere, creating a charge separation leading to a polarisation electric field.