



## **Review of the results from Analyzer of Space Plasmas and Energetic Atoms ASPERA-4 onboard Venus Express**

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Analyzer of Space Plasmas and Energetic Atoms (ASPERA-4) onboard Venus Express provides measurements of electrons, ions (with mass resolution) and energetic neutral atoms (ENA) in the energy range from few eV to 10 - 40 keV (sensor dependent). The talk reviews the main results achieved by the experiment during the first two years of operations at Venus. The morphology of the plasma wake and the bow shock and induced magnetosphere boundary locations during the solar minimum conditions are established. The plasma in the wake consists of oxygen, hydrogen, and helium ions of the planetary origin. The ions are accelerated either to energies above few hundreds eV dependent on the ion masses or to energies below 50 eV independent on mass via ion pick-up or by the electric field caused by the pressure gradient (polar wind). The escape rate ratio of hydrogen to oxygen corresponds to the stoichiometric ratio of water. The experiment also observed for the first time characteristic ionospheric photoelectrons released due to carbon dioxide photoionization. The observed ENAs result from the solar wind charging - exchanging on the exosphere. The intensity of the signal reaches several  $10^5 \text{ cm}^{-2} \text{ sr}^{-1} \text{ s}^{-1}$  which is consistent with present theories of the plasma and neutral particle distributions around Venus.