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Planetary hydrogen and oxygen on the nightside of Mars

A. Galli (1), P. Wurz (1), R. Lundin (2), S. Barabash (2), A. Grigoriev (2), M. Holmström (2), A. Fedorov (3) and the ASPERA-3 team

(1) University of Bern, Physikalisches Institut, CH-3012 Bern, Switzerland (galli@phim.unibe.ch), (2) Swedish Institute of Space Physics, Box 812, SE-981 28 Kiruna, Sweden, (3) Centre d'Etude Spatiale des Rayonnements, BP-4346, F-31028 Toulouse, France

We present an overview of energetic neutral particle data that were measured on the nightside of Mars during ESA's Mars Express mission in spring 2004. We measured on several occasions an intense tailward flow of accelerated hydrogen atoms, which we identified as planetary particles or neutralized solar wind protons. Energetic oxygen atoms, on the other hand, were never detected above the uncertainty level of 10^4 cm^{-2} sr^{-1} s^{-1}, in contradiction to theoretical predictions.

To interpret our measurements, we study the temporal variation and the spatial distribution of the energetic hydrogen fluxes, and we compare the energy spectrum and the flux intensity with theoretical predictions. The absence of a detectable tailward flow of energetic oxygen can be explained by low exospheric densities. If true, this suggests low atmospheric loss rates.