

ENA observations at Mars (3): Oscillations of the ENA Flux From the Subsolar Region at Mars

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Neutral Particle Detector (NPD) of the ASPERA-3 experiment (Analyser of Space Plasmas and Energetic Atoms) onboard Mars-Express mission is designed to measure Energetic Neutral Atoms (ENA) in the energy range 0.1 - 10 KeV with an energy resolution of 80% and a mass resolution sufficient to separate H and O. During the first year of observations around Mars under suitable observation geometry NPD detected an ENA flux emitted anisotropically from the subsolar region. Time-of-Flight analysis shows that the detected ENAs are hydrogen atoms with an energy of 1.4 KeV.

In several cases the ENA flux has very evident short-time scale variations as the spacecraft moves outward the planet but sustains the NPD pointing toward the subsolar region. Several tens of orbits have been analysed and 19 cases have been found to have strong signatures of the oscillations. The oscillation period varies from orbit to orbit and is about 130 to 240 sec on average. The drops in the ENA flux reached 30% - 60% of the maximum value. In situ observations by an electron instrument of ASPERA-3 show signatures of electron flux variations. We discuss possible interpretations of the detected oscillations which can be either temporal variations in the generation region caused by an instability at the induced magnetosphere boundary, or spacial variations of the ENA flux.