AOGS 2005

ENA originating from the solar wind acceleration region in the solar corona

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Neutral hydrogen atoms are closely coupled to the emerging solar wind plasma. They give rise to the prominent solar Ly-∝ corona. The ratio of the densities of neutral hydrogen and protons is very small, some parts per million, and the neutral atoms are therefore a trace particle population in the solar wind plasma [1,2]. In-situ observations of the neutral atoms, their flight paths (imaging), densities and velocity distributions might help to redefine the understanding of the Ly-∝ corona. Beyond 3 solar radii, the neutral atoms become more and more decoupled from the plasma. This neutral solar wind then constitutes an in-situ trace particle population of the solar wind plasma within a few solar radii, which is observable at 0.21 AU (Perihelia of Solar Orbiter). The measurement of the density and velocity distribution functions of the hydrogen atoms in the solar wind energy regime, i.e. the velocity components parallel and perpendicular to the magnetic field, by an in-situ particle instrument might help to understand and model the H-plasma interaction even beyond 3 solar radii. We will discuss the goals and objectives of neutral particle sensors capable to detect 100-1000 atoms per second in an environment dominated by solar radiation and solar wind plasma.

References

[1] Olsen E.L. et al., ApJ, 420, 913-925 (1994)
[2] Allen L.A. et al., JGR, 103, 6551 (1998)