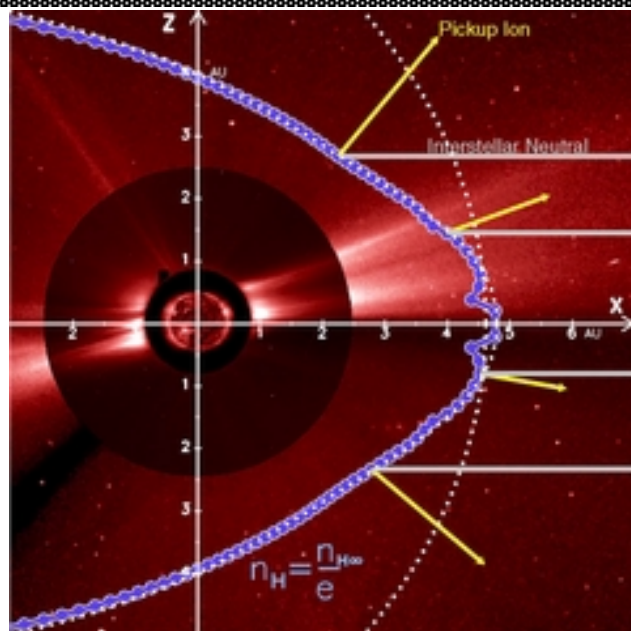
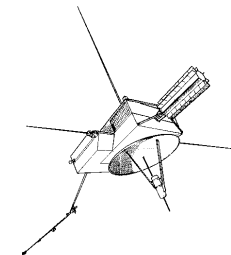




# Variability of the charge exchange rate of interstellar neutrals with the solar wind



The interstellar neutral depletion cavity protrudes substantially further upwind at low than at high latitudes (blue curve) compared to previous ideas of the cavity shape (white curve). EIT and LASCO images of the Sun and corona are shown (not to scale) to indicate the role of solar stream structure at low latitudes.

Some of the interstellar neutrals entering the solar system, particularly those passing near the Sun, are ionized and picked up by the solar wind. Solar wind observations taken by the Los Alamos SWOOPS instrument over Ulysses' first orbit have been used to determine the variability in the charge exchange rate between solar wind protons and interstellar hydrogen atom (McComas *et al.*, *GRL*, 26, p. 2701, 1999). As the charge exchange cross section depends on speed, enhanced ionization occurs in regions of low velocity and high density. Such conditions occur in co-rotating interaction regions (CIRs), which are created by collisions of solar wind streams. The increased ionization is greatest at low latitudes where CIRs are an important component of the solar wind stream structure. The variability of the hydrogen charge exchange has implications for analysis of scattered Lyman- $\alpha$  and the rate of production of pickup ions, the seed population for anomalous cosmic rays.