The slow solar wind that resembles the fast wind: new insights

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Over the past few years it has become increasingly clear that the paradigm according to which the solar wind comes in two distinct flavors (fast and slow solar wind) must be revised. Especially around solar maximum, a slow wind with many characteristics similar to the fast wind has been found. One such feature is the high Alfvenic content of velocity and magnetic field fluctuations, whose correlation can be as great as that found in the fast wind, and with a similar dominance of outward propagating waves, a peculiarity which is still under study. It has been suggested that the similarity of this and other characteristics is due to a common origin for the two types of solar wind, with a major role attributed to the super-radial expansion responsible for the lower velocity of the slow wind.

These new findings have relevant implications for the upcoming Solar Orbiter and Parker Solar Probe missions and more generally for solar wind measurements close to the Sun. One of the main objectives of these two missions is to investigate the solar sources of the slow solar wind.

Composition analysis can provide a better understanding in this regard. A particular focus will be placed on helium (alpha particles) whose abundance in the solar wind oscillates but is typically a few percent and is thus well resolved in plasma analyzers. Alpha particles moments will be compared with the protons ones and some derived parameters will be studied including for instance temperature ratio, density ratio, drift velocity and anisotropy. This study will be performed for different solar wind regimes to better characterized their differences and similarities.