

The solar wind: challenges for theory, modelling and observations

Rui F. Pinto

The solar wind is an uninterrupted flow of highly ionised plasma that is accelerated in the low solar corona and expands into the interplanetary space. Fast and slow wind streams develop at different places in the solar atmosphere, following closely the large-scale distribution of the coronal magnetic field at all moments of the solar cycle. Beyond their terminal speed, slow and fast wind flows also typically show different acceleration length-scales, density and temperature radial profiles, heavy ion composition, types of waves and turbulent spectra. The solar wind background flow is furthermore a key component of space weather, being the source of corotating density structures that perturb planetary atmospheres and affecting the evolution and propagation of more energetic perturbations (such as CME).

An unprecedented ensemble of space missions will be launched in the next years, and will provide the community with many new insights on long-standing open questions.

I will review recent research on the topic over the last years, the major challenges faced, and direction of future research in terms of solar wind observations, theory and modelling.