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Synergetic observations of the Sun and heliosphere with Solar Orbiter/Metis and Parker Solar Probe

D. Telloni*(1), and the Solar Orbiter/Metis and Parker Solar Probe teams
(1) National Institute for Astrophysics, Astrophysical Observatory of Torino, Via Osservatorio 20, I-10025 Pino Torinese, Italy; e-mail: daniele.telloni@inaf.it

By exploiting the full potential of the joint observations performed by Parker Solar Probe and the Metis coronagraph on board Solar Orbiter, local measurements of the solar wind can be linked with the large-scale structures of the solar corona, leading to new insights into the coronal flow properties. For instance, the results suggest that the dynamics of the current sheet layers generates turbulence, which in turn creates a sufficiently strong temperature anisotropy to make the solar-wind plasma unstable to anisotropy-driven instabilities such as the Alfvén ion cyclotron, mirror-mode, and firehose instabilities. Other interesting results concerning the propagation of the solar wind from the solar corona to the very inner heliosphere the estimation of the rate of energy transfer by turbulence into the corona, the energy budget in the corona will be presented.

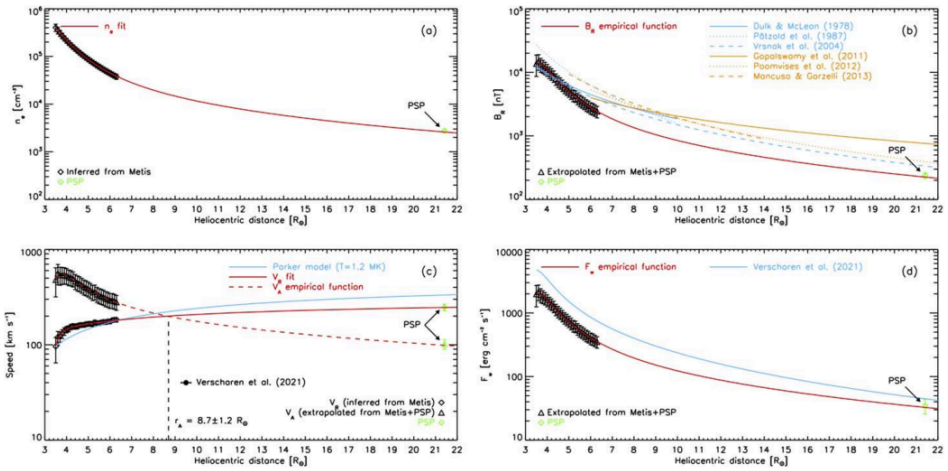

Figure 1. Radial evolution of electron density (a), radial component of the magnetic field (b), radial coronal outflow and Alfvén speed (c), and bulk kinetic energy flux density of the solar wind (d), at coronal (black signs) and PSP (green sign, pointed by an arrow) heights.

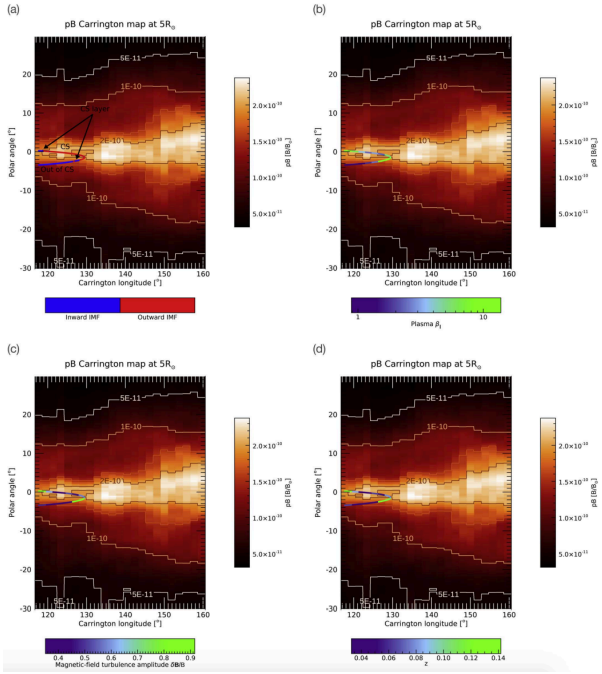

Figure 2. Projection onto the Metis pB Carrington map of (a) the IMF direction, (b) proton plasma, (c) magnetic-field turbulence amplitude, and (d) magnetic-field deflection (d), estimated from PSP measurements. The topology of the CS as flown through by PSP is outlined in (a).