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Classical ideas about the origin of the solar wind often include driving by waves originating in the photosphere, as well as reconfiguration of the magnetic field by reconnection deep in the corona or chromosphere. The standard wind accelerates gradually and passes a smooth Alfven surface somewhere around 10 to 30 Rs. Subsequent super-Alfvenic outward streaming is disconnected from the corona in a magnetohydrodynamic sense. These features remain of unquestionable importance. Recent Parker Solar Probe (PSP) and STEREO observations suggest additional detailed features that may be of importance, several of which will be discussed here: (1) Conformation of the association of the supergranulation scale with organization of the coronal flows and magnetic fields, which has long been recognized based on both remote sensing of solar images and in situ observations of microstreams (Neugebauer et al, 1995); (2) Differential radial flows exceeding 100km/s in the corona, an energy source that is transported upwards in the magnetically controlled corona (DeForest et al, 2016, 2018), may represent a source of augmented turbulence beyond the criticial Alfven region (Ruffolo et al, 2020); (3) Assumptions concerning the nature of the low beta sub-Alfvenic corona are now being confirmed directly by PSP (Bandyopadhyay et al, 2022) ; (4) The transition between sub- and super-Alfvenic wind, which appears not to be smooth, may even be fragmented (Chhiber et al, 2022). Such features provide a framework for reconsideration of a number of ideas about solar wind heating and energy transport, as well as the role of “switchbacks” (Ruffolo et al, 2020; Pecora et al, 2023) and energization of suprathermal particles in a “pressure cooker” scenario (Mitchell et al, 2020). The PUNCH mission can be expected to further depth to our understanding of these interrelated fundamental heliospheric phenomena.

Bale et al, Nature, 618, 252 (2023)
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DeForest et al, ApJ, 828, 66 (2016)
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