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Probing solar wind origins and coronal parameters through PSP–SolO quadrature and corotation studies

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The quadrature and corotation configurations between Parker Solar Probe (PSP) and Solar Orbiter (SolO) provide an exceptional opportunity to study the coupling between the solar corona and the nascent solar wind. We analyze coordinated remote-sensing (RS) and in-situ observations obtained during periods when PSP corotated with the Sun while SolO viewed the same source regions from near-quadrature vantage points. This unique geometry enables simultaneous sampling of coronal structures and their heliospheric extensions. Using the SolO Metis coronograph's high-resolution ultraviolet (UV) and polarized visible light (VL) diagnostics, we derive the coronal electron density, proton density, and magnetic topology. Meanwhile, PSP in-situ data constrain plasma and field properties at several solar radii. Additionally, by combining these datasets through the Doppler Dimming Tool (DDT), we reconstruct the plane of the sky distribution of solar wind speed and identify the coronal origins of distinct solar wind streams and the cause of solar wind acceleration.

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