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Understanding the large-scale magnetic field of the open-field solar corona is of critical importance for describing the production mechanism of the ambient solar wind as well as the propagation dynamics of the fast-traveling embedded structures such as coronal mass ejections. The Quasi-Radial Field-line Tracing (QRaFT) image analysis framework has been developed for reconstructing the three-dimensional structure of the open-flux coronal regions across a wide range of heliocentric distances. We will present the results of a quantitative validation of QRaFT using global magnetohydrodynamic simulations, and the examples of its application to different types of coronagraphic data, including synthetic coronal images produced by the FORWARD code as well as real-life polarized intensity images obtained from ground-based and space-borne coronagraphs such as MLSO K-cor and STEREO COR1. We will discuss the capabilities of QRaFT to reconstruct the geometry of the outermost solar corona and the young solar wind targeted by the upcoming PUNCH mission, and demonstrate how QRaFT segmentation of PUNCH data products could result in new quantitative metrics for measuring the performance of global heliospheric models and improving space weather forecasts.
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