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Oral
(Contributed Talk)
Observations of the solar corona provide key insight to the determination of the orientation of the Sun's magnetic field. Previous studies used quasi-radial features detected in coronagraph images to improve coronal magnetic field models by comparing the orientation of the detected features to the projected orientation of the model field. As a part of these studies, coronal features were traced using the Quasi-Radial Feature Tracing (QRaFT) algorithm, which uses adaptive thresholds to extract coronal features and approximate their projected shapes as polynomials. The orientation of these traced features is then used as input for optimizing and constraining a coronal magnetic field model. We compare quasi-radial features traced by QRaFT in white-light coronagraph observations obtained from the K-Coronagraph instrument at the Mauna Loa Solar Observatory (MLSO K-Cor) and from the COR-1 coronagraph aboard NASA's STEREO spacecraft to outputs of an advanced solar coronal MHD model developed by Predictive Science Inc. (PSI) for forecasting recent solar eclipses. This model provides a 3D solution of the corona which allows us to rotate and project the output onto a plane-of-sky view from any perspective. We do this by using the FORWARD toolset to rotate the output solution from PSI's 2017 solar eclipse prediction to each observatory's perspective and then integrate the electron density of the model solution to produce synthetic coronagraph images co-aligned to each coronagraph observation. We utilize the magnetic field parameters generated by this model to measure the geometric discrepancy between the expected magnetic orientation from the solar coronal model and the extracted coronal features from QRaFT, performing this comparison on both the model images and white-light coronagraph observations. We then use a set of statistical indicators that measure the similarity of these results to compute the accuracy and uncertainty of the model output to the observational data. Preliminary results show close correlation of the performance of the QRaFT algorithm on both the synthetic images and white-light coronagraph observations when compared to the expected magnetic orientation from the model. Overall, this framework should further validate and benchmark coronal image segmentations against a ground truth MHD solution which would provide useful benefits for the PUNCH mission.
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