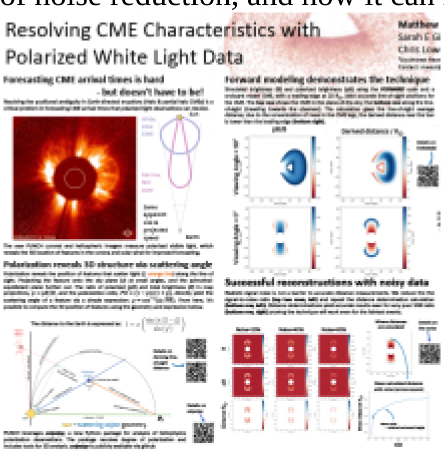
Matthew
West
Southwest Research Institute
Sarah E Gibson - National Center for Atmospheric Research, High Altitude Observatory;
James Marcus Hughes - Southwest Research Institute;
Ritesh Patel - Southwest Research Institute;
Chris Lowder - Southwest Research Institute;
Craig DeForest - Southwest Research Institute;
Daniel B Seaton - Southwest Research Institute;
Anna V Malanushenko - National Center for Atmospheric Research, High Altitude Observatory
Poster
The line of sight propagation of coronal mass ejections (CMEs) throughout the heliosphere can be determined directly from total and polarized brightness measurements with instruments such as the LASCO, COR, and future PUNCH imagers. By using the physics of Thomson scattering applied to synoptic polarized images, and a symmetric three-polarizer measurement and representation system, the Stokes parameters can be derived, which in turn can be used to derive distances of structures. To accurately determine the position of structures measurements require relative photometric accuracy at a few percent precision, which is undermined by instrument and photometric noise, which redistributes measured polarization angles.

In this presentation the ability to accurately measure the 3D structure of imaged objects in the heliosphere, using polarized brightness measurements is assessed. "Clean" synthetic data produced with the Gamera model, forward modelled to look like white light coronagraph data using the HAO FORWARD algorithms, is used with a polarization resolver to determine the line of sight distance of synthetic CMEs. Additionally, realistic photometric (poisson) and instrument noise is applied to the data to assess the impact on the estimated positions of structures. The noisy data is subsequently "noise-gated" to reduce noise and mitigate its impact. The impacts of noise reduction, and how it can improve estimates of 3D position are assessed.


Poster PDF
West-Matthew_0.pdf

Poster category:

Poster category
Solar and Interplanetary Research and Applications
Meeting homepage
Space Weather Workshop 2023
Download to PDF