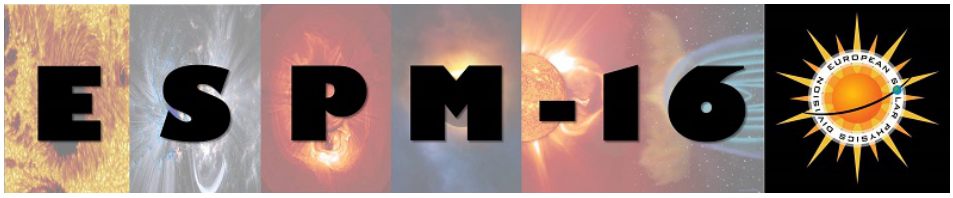

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Revised SDO/AIA Point Spread Functions to Correct for Long-Distance Scattered Light

Tuesday 7 September 2021 10:05 (13 minutes)

The Atmospheric Imaging Assembly (AIA) on the Solar Dynamics Observatory (SDO) is one of the most-used data sources in solar physics. Its point spread functions (PSF) were well calibrated by the instrument team, and allows high-quality observations of the solar corona at a resolution of ~1.5 arcsec for quiet Sun and active regions. However, it is suspected that low-emission features such as coronal holes still contain a significant contribution of diffusive, long-distance scattered light due to the microroughness of the mirrors, which is not accounted for by the PSFs provided by the instrument team.
We have developed a novel analytical technique that uses eclipse images and enables us to update the existing PSFs for diffusively scattered light. No preexisting knowledge on the shape of the missing part of the PSF is required. Applying this technique to the PSF provided by the instrument team, combined with analyzing 50 partial solar eclipses, shows that an additional 5% of the light is scattered farther away than 100 arcsec.
These missing 5% result in that the intensity of bright structures, such as active regions, is increased by an additional 5% as compared to AIA images deconvolved with the original PSFs. However, the intensity of dark structures, such as coronal holes, is decreased by about 40% as compared to AIA images deconvolved with the original PSFs. Our results demonstrate that for dark structures such as coronal holes, coronal dimmings, and filament channels, taking into account and correcting for the long-distance scattered light is essential.

Student poster?

Authors: HOFMEISTER, Stefan (stefan.hofmeister@columbia.edu); Dr SAVIN, Daniel Wolf (Columbia Astrophysics Laboratory, Columbia University, New York, NY, USA); Mr HAHN, Michael (Columbia Astrophysics Laboratory, Columbia University, New York, NY, USA)

Presenter: HOFMEISTER, Stefan (stefan.hofmeister@columbia.edu)

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