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Oral
(Invited Talk)
Visualizing fine-scale structures in solar imagery remains challenging due to the Sun’s extreme dynamic range of emissivity, where subtle signals can easily be overwhelmed by the overall intensity variation. Over the past few decades, several families of detail-enhancement techniques have been developed both within and beyond the solar physics community. These techniques—such as histogram enhancement, multiscale decomposition, and radial-graded filtering—can significantly improve the visibility of key features.

In this presentation, I provide an overview and contrast of current detail-enhancement methods and demonstrate their application to diverse datasets, including Atmospheric Imaging Assembly (AIA) images, synthetic PUNCH imagery generated via the GAMERA model, and the well-known deep-field COR2 observations. I show the effect of the different transformations on the radial histograms and discuss the appropriate scientific investigations enabled by these enhancements, along with potential side-effects or limitations. All methods highlighted in this work are accessible through the sunkit-image.radial software package.

By illustrating how various approaches can address the challenges inherent in high-dynamic-range solar imagery, this talk aims to guide researchers in selecting and applying detail-enhancement techniques that optimize data interpretation while maintaining scientific rigor.
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