Institute for Space Weather Sciences Colloquium

Thursday, 6th of Nov 2025,   1:00pm ET

ECE 202 & via Zoom (meeting ID: 955 9399 6954,   password: isws)

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Ten Thousand Filaments, Manually Annotated: Can AI Tell Their Chirality?

The automation of detection and analysis of solar filaments has been a critical research-objective of the community for over two decades. Several major leaps have been demonstrated so far, however, the contribution of the AI-era algorithms (i.e., deep neural networks; DNN) has not been as impressive as expected. This is primarily due to the absence of large, gold-standard datasets of filaments. In this talk, I introduce MAGFiLO (https://www.mlecofi.net/magfilo), the largest manually-annotated dataset of solar filaments, which contains spatiotemporal information about over 10,000 filaments, as well as their magnetic-field chirality. MAGFiLO opens the door for the true power of supervised DNN algorithms to be explored. I will also showcase the first attempt towards automatic identification of filaments' chirality, the true performance, and the challenges involved.

Azim Ahmadzadeh is an Assistant Professor of Computer Science at the University of Missouri-St. Louis. He earned his Ph.D. and M.S. degrees in Computer Science from Georgia State University. Dr. Ahmadzadeh's doctoral research, titled "Machine Learning of Scientific Events: Classification, Detection, and Verification," focused on the application of machine learning techniques to solar flares and filaments. His current research interests include machine learning, ML-ready dataset development, object detection, time series analysis, model evaluation, and the customization of model objective functions. In collaboration with NSO, GSU, and more recently with NJIT, his NSF-funded interdisciplinary research addresses challenges in solar physics and space weather, such as flare forecasting, forecast performance evaluation, pixel-precise detection of solar filaments, and prediction of filament eruptions. (https://www.azim-a.com/)