



Institute for Space Weather Sciences Colloquium

Thursday, 2nd of November 2023, 1pm EDT

In *CKB 116* & via njit.webex.com, meeting ID: 2621 447 3191, password: isws

Dr. David Fouhey, New York University

Adventures in Using Computer Vision for Solar Physics and Space Weather

In this talk, I will show techniques that my computer vision research group and collaborators in solar physics have built over the past three years that apply machine learning to important problems for space weather. One particular focus has been building new tools for obtaining magnetograms, which are traditionally produced by Stokes inversion, or inverting a generative process describing how magnetized plasma produces polarized light. We have developed and tested a series of deep-learning based approaches for magnetogram generation. These include a new method that directly produces the physics-ready, heliographic data that is needed in many applications, but which traditionally requires an additional step to resolve an intrinsic ambiguity in Stokes inversion.

These methods are the result of long-term collaborations and reflect both machine learning and solar physics. By being learning-based, these approaches are extremely fast, and can also be tasked with new challenges, such as generating the magnetograms of one instrument from the Stokes observations of another instrument. By being informed by the underlying problem and likely downstream space weather uses, the approaches work better than off-the-shelf machine learning methods and have also been subject to far more thorough evaluation (e.g., for systematic errors) as compared to many machine learning settings.



Dr. David Fouhey is an assistant professor at New York University. He received a Ph.D. in Robotics from Carnegie Mellon University where he was supported by NSF and NDSEG fellowships. He was then a postdoctoral fellow at UC Berkeley and an assistant professor at the University of Michigan. He has spent time at the University of Oxford's VGG, INRIA Paris, and Microsoft Research and has received a NSF CAREER award.