Matthew Meehan

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Interests

Data science, statistics, data visualization, machine learning, deep learning, computer vision, distributed sensors, data ethics

Skills

- **Technical**: Python, NumPy, SciPy, scikit-learn, Keras, matplotlib, HTCondor, linux, Git, LaTeX
- **Other**: Scientific communication, technical problem solving, teaching, mentoring, physics

Work Experience

Wisconsin IceCube Particle Astrophysics Center — Madison, WI
Research Assistant — May 2014 – Present

- Performed big data analysis of astrophysical data from NASA's Fermi Large Area Telescope on a distributed, high-throughput computing cluster (100 GB - 100 TB scale pipelines)
- Developed and deployed a covolutional neural network to identify images of particles detected by a network of smartphones with 95% accuracy
- Utilized Monto-Carlo simulations to quantify algorithmic biases and systematic uncertainties for cosmic-ray measurements at the 0.1% level
- Created unbiased, data-driven algorithms to estimate physical parameters of cosmic-ray arrival direction distribution
- Developed random forest regression model to estimate angular uncertainty of cosmic rays detected by the Fermi telescope
- Worked in an international collaboration of 400+ scientists, coordinate working group, co-chair weekly international conference calls
- Regularly presented work at national and international conferences
- Mentored undergraduate researchers and high school students on data analysis projects

Department of Physics, University of Wisconsin-Madison — Madison, WI
Teaching Assistant — August 2013 – May 2014

- Designed discussion curriculum and taught calculus-based electricity and magnetism course to 50 engineering students each semester
- Received Honored Instructor award for teaching excellence (nominated by students)

Education

University of Wisconsin-Madison — Madison, WI
Ph.D., Physics (graduating Dec 2018) — 2013 – 2018
M.S., Physics — 2013 – 2016

Kutztown University of Pennsylvania — Kutztown, PA
B.S., Physics, Minor, Mathematics — 2010 – 2013

Selected Publications

- M. Winter, J. Bourbeau, M. Meehan, J. Vandenbroucke, et al., **Particle Identification In Camera Image Sensors Using Computer Vision**. Astroparticle Physics, 104 (2018), 42-53. https://doi.org/10.1016/j.astropartphys.2018.08.009.
- M. Meehan, J. Vandenbroucke, for the Fermi-LAT Collaboration, **A Search for Cosmic-ray Proton Anisotropy with the Fermi Large Area Telescope**. Proceedings of Science. (ICRC2017) 170. https://doi.org/10.22323/1.301.0170.
- M. Meehan, et al., **The particle detector in your pocket: The Distributed Electronic Cosmic-ray Observatory**. Proceedings of Science. (ICRC2017) 375. https://doi.org/10.22323/1.301.0375.