Paul J. Wright, PhD
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EXPERIENCE

Postdoctoral Scholar (Hansen Experimental Physics Lab), Stanford University 2019 – present
Department of Physics, Stanford University, Stanford, CA, USA

- Supporting operations of a flagship NASA mission: The Solar Dynamics Observatory (∼$1B).
- Modifying state-of-the-art convolutional neural networks (CNNs) for scientific applications.

Courses Audited: CS229 (Machine Learning [ML]; Autumn 2019)

Team Lead & Core Domain Mentor, NASA Frontier Development Lab (FDL) 2019 – present
SETI Institute/NASA Ames Research Center, Mountain View, CA, USA
NASA FDL is an 8-week applied artificial intelligence (AI) research accelerator that applies ML techniques to challenges in space science and exploration.

- Co-developed a project to up-scale and convert data between space-based instruments using state-of-the-art deep learning architectures for image-based super-resolution.
- **Facilitated a 3-day Design Sprint at Google Cloud HQ** to define the project deliverables.
- **Recruited, led, and managed a multi-national team of 12** (four PhD/Postdoctoral-level researchers and eight mentors, including two super-resolution experts from Element AI).
- Communicated and managed expectations of stakeholders (Google Cloud, Intel AI, NASA).
- Presented an *invited* talk at the American Geophysical Union Fall Meeting ($\sim 30,000$ attendees), and **guided two NeurIPS**(/NIPS) **(peer-reviewed) workshop papers** (in *Machine Learning and the Physical Sciences*, and *Bayesian Deep Learning*) **to submission (and acceptance)**.

Post-Graduate Research Assistant (PhD Student), University of Glasgow 2014 – 2019
SUPA School of Physics and Astronomy, University of Glasgow, Glasgow, UK

- Developed Python code to analyse observations of the Sun with a telescope that was not designed for heliophysics; this enabled numerous highly-collaborative peer-reviewed publications.
- Generated a **press-release image** that was **published by numerous news outlets**, included in books, and is one of the five iconic images from *NuSTAR*'s first five years in space.
- Analysed time-series with Fourier analysis, wavelet analysis, and local intermittency measure.
- Studied the temperature distribution of the solar atmosphere by solving an ill-posed inverse problem using ridge regression, Markov chain Monte Carlo, and sparse inversion (basis pursuit).

Researcher, NASA Frontier Development Lab (FDL) 2018
SETI Institute/NASA Ames Research Center, Mountain View, CA, USA

- **Cleaned and curated 12 PB of raw (science) data** to produce a 6.5 TB ML-ready data set.
- Implemented and modified CNNs such as U-Net, AlexNet, and ResNet to predict a 14-element vector (spectral line intensities) from narrowband images ($4096 \times 4096 \times 9$).
- Nowcast spectral line intensity with median absolute relative uncertainties of less than 1.6% per emission line using a CNN augmented with a Multi-Layer Perceptron (MLP), **saving $280M on a new instrument**; the results were published in *Science Advances* (a high-impact journal).
- Developed and wrote an ebook chapter (Jupyter Notebook) on how to implement a 1×1 CNN in PyTorch to solve an ill-posed inverse problem (supervised learning; $10\times$ speed increase).

EDUCATION

PhD Physics, University of Glasgow, UK 2014 – 2019
MPhys Physics & Astrophysics (First-Class Honours), University of Southampton, UK 2010 – 2014
Visiting Student: Harvard University; Smithsonian Institution; NASA Goddard Space Flight Center

ADDITIONAL SKILLS

Adobe InDesign, Bash, Data Analysis, Data Science, Data Visualization, Experimental Design, Git, Google Cloud Platform, Jupyter, MCMC, Python (matplotlib, seaborn, pandas, scikit-learn), Presenting (Technical and Lay), PyTorch, R, Shell scripting, Writing (Technical and Lay), YAML.