

## Paul J. Wright, PhD

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EXPERIENCE	<p><b>Postdoctoral Scholar</b> (Hansen Experimental Physics Lab), Stanford University 2019 – present Department of Physics, Stanford University, Stanford, CA, USA</p> <ul style="list-style-type: none"><li>• Supporting operations of a flagship NASA mission: The Solar Dynamics Observatory (~\$1B).</li><li>• Modifying state-of-the-art convolutional neural networks (CNNs) for scientific applications.</li><li>• Collaborating with 9 researchers (5 time zones) to complete an applied deep learning project.</li></ul> <p>Courses Audited: CS229 (Machine Learning [ML]; Autumn 2019)</p> <p><b>Team Lead &amp; Core Domain Mentor</b>, NASA Frontier Development Lab (FDL) 2019 – present SETI Institute/NASA Ames Research Center, Mountain View, CA, USA <i>NASA FDL is an 8-week applied artificial intelligence (AI) research accelerator that applies ML techniques to challenges in space science and exploration.</i></p> <ul style="list-style-type: none"><li>• Designed and developed a project to up-scale and convert data between space-based instruments using state-of-the-art deep learning architectures for super-resolution.</li><li>• <b>Facilitated a 3-day Design Sprint at Google Cloud HQ</b> to define the project deliverables.</li><li>• <b>Recruited, led, and managed a multi-national team of 12</b> (four PhD/Postdoctoral-level researchers and eight mentors, including two super-resolution experts from Element AI).</li><li>• Communicated and managed expectations of stakeholders (Google Cloud, Intel AI, NASA).</li><li>• Presented an <i>invited</i> talk at the American Geophysical Union Fall Meeting (~ 30, 000 attendees), and <b>guided two NeurIPS/(NIPS) (peer-reviewed) workshop papers</b> (in <i>Machine Learning and the Physical Sciences</i>, and <i>Bayesian Deep Learning</i>) <b>to submission</b>.</li></ul> <p><b>Post-Graduate Research Assistant</b> (PhD Student), University of Glasgow 2014 – 2019 SUPA School of Physics and Astronomy, University of Glasgow, Glasgow, UK</p> <ul style="list-style-type: none"><li>• 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.</li><li>• Generated a <b>press-release image</b> that was <b>published by numerous news outlets</b>, included in books, and is one of the five iconic images from <i>NuSTAR's first five years in space</i>.</li><li>• Analysed time-series with Fourier analysis, wavelet analysis, and local intermittency measure.</li><li>• Studied the temperature distribution of the solar atmosphere through the recovery of an ill-posed inverse problem using ridge regression, Markov chain Monte Carlo (MCMC), and sparse inversion (basis pursuit).</li></ul> <p><b>Researcher</b>, NASA Frontier Development Lab (FDL) 2018 SETI Institute/NASA Ames Research Center, Mountain View, CA, USA</p> <ul style="list-style-type: none"><li>• <b>Cleaned and curated 12 PB of raw (science) data</b> to produce a 6.5 TB ML-ready data set.</li><li>• Implemented and modified CNNs such as U-Net, AlexNet, and ResNet to predict a 14-element vector (spectral line intensities) from narrowband images (<math>4096 \times 4096 \times 9</math>).</li><li>• 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), <b>saving \$280M on a new instrument</b>; the results were published in <i>Science Advances</i> (a high-impact journal).</li><li>• Developed and wrote an ebook chapter (Jupyter Notebook) on how to implement a <math>1 \times 1</math> CNN in PyTorch to solve an ill-posed inverse problem (supervised learning; <math>10\times</math> speed increase).</li></ul> <tr><td>EDUCATION</td><td><p><b>PhD Physics</b>, University of Glasgow, UK 2014 – 2019 <b>MPhys Physics &amp; Astrophysics</b> (First-Class Honours), University of Southampton, UK 2010 – 2014 Visiting Student: Harvard University; Smithsonian Institution; NASA Goddard Space Flight Center</p></td></tr> <tr><td>ADDITIONAL SKILLS</td><td><p>Adobe InDesign, Algorithms, Bash, Computer Vision, Data Analysis, Data Science, Data Visualization, Experimental Design, Git, Google Cloud Platform, Jupyter, MCMC, Python (matplotlib, pandas, scikit-learn), PyTorch, R, Shell scripting.</p></td></tr>	EDUCATION	<p><b>PhD Physics</b>, University of Glasgow, UK 2014 – 2019 <b>MPhys Physics &amp; Astrophysics</b> (First-Class Honours), University of Southampton, UK 2010 – 2014 Visiting Student: Harvard University; Smithsonian Institution; NASA Goddard Space Flight Center</p>	ADDITIONAL SKILLS	<p>Adobe InDesign, Algorithms, Bash, Computer Vision, Data Analysis, Data Science, Data Visualization, Experimental Design, Git, Google Cloud Platform, Jupyter, MCMC, Python (matplotlib, pandas, scikit-learn), PyTorch, R, Shell scripting.</p>
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