

EXPERIENCE	<p>Postdoctoral Scholar (Hansen Experimental Physics Lab), Stanford University 2019 – present Department of Physics, Stanford University, Stanford, CA, USA</p> <ul style="list-style-type: none"> Supporting operations of a flagship NASA Mission: The Solar Dynamics Observatory (~\$1B). Modifying state-of-the-art convolutional neural networks (CNNs) for scientific applications. Collaborating with 9 researchers (5 time zones) to complete an applied deep learning project. <p>Courses Audited: CS229 (Machine Learning [ML]; Autumn 2019); CS230 (Deep Learning; Winter 2019); CS231n (Convolutional Neural Networks for Visual Recognition; Spring 2020);</p> <p>Team Lead & Core Domain Mentor, 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"> 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. 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 <i>invited</i> talk at the American Geophysical Union Fall Meeting (~ 30,000 attendees), and guided two NeurIPS/(NIPS) (peer-reviewed) workshop papers (in <i>Machine Learning and the Physical Sciences</i>, and <i>Bayesian Deep Learning</i>) to submission. <p>Post-Graduate Research Assistant (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"> 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 <i>NuSTAR's first five years in space</i>. Analysed time-series with Fourier analysis, wavelet analysis, and local intermittency measure. 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). <p>Researcher, NASA Frontier Development Lab (FDL) 2018 SETI Institute/NASA Ames Research Center, Mountain View, CA, USA</p> <ul style="list-style-type: none"> 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 <i>Science Advances</i> (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	<p>PhD Physics, University of Glasgow, UK 2014 – 2019 MPhys Physics & Astrophysics, 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>