GRIFFIN S FOSTER

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SUMMARY

Researcher with over a decade experience in high-bandwidth signal processing and data analysis with a strong background in physics, computer science, statistics, and electrical engineering. Currently developing new techniques to automate radio astronomy search pipelines and SETI surveys using statistical and machine learning techniques. Past work has focused on building FPGA-based instruments and searching for rare signal events. Author of numerous peer-reviewed journal manuscripts and a textbook on observational astronomy.

EDUCATION

2009-2013 — **University of Oxford, St. Peter's College**

PhD

Astrophysics
Thesis: *Large-N Correlator Systems for Low-Frequency Radio Astronomy*

2003-2007 — **University of California, Berkeley**

Bachelor of Arts

Physics and Astrophysics · College of Letters and Science
Double major, with a minor in Computer Science

VOCATIONAL HISTORY

University of Oxford

University of California, Berkeley

Nov. 2016–Present — **Project Scientist**

Construction of pipelines and automated triggers for processing multi-TB per day datasets using heterogeneous systems of FPGAs, GPUs, and CPUs. Development of machine learning-based anomaly detection methods for Breakthrough Listen SETI (Search for Extraterrestrial Intelligence) and radio transient surveys. Deployment of a 138-node compute cluster to process 1.7 Tbps of streaming data.

Square Kilometre Array South Africa

July 2013–Oct. 2016 — **Square Kilometre Array Research Fellow**

Used feature detection techniques from computer vision to automate source finding and rare event detection pipelines. Radio galaxy classification using basis decomposition (shapelet, wavelet) and wide learning techniques (PCA, SVM, ensemble methods). Advisor to multiple PhD and Masters students, and taught a Masters' level course on observational radio astronomy techniques.

University of Oxford, Astrophysics

Oct. 2009–June 2013 — **DPhil Student and Researcher**

Led the design of FPGA-based, streaming cross-correlation instruments (ingesting $\sim$100 Gbps data rates and reduced output rates of $\sim$100 Mbps) for radio interferometric arrays in the UK and Italy. Built a python and C-based pipeline to calibrate and produce sky maps from the reduced streaming data using linear algebra and Fourier techniques.

TECHNICAL SKILLS

Mathematics

Digital Signal Processing, Linear Algebra, Statistics, Fourier Analysis, Multivariate-Calculus, Basis Set Decomposition, Discrete Mathematics

Computing Languages

Python, Matlab/Octave, SQL, PHP, C, HTML/CSS, BASH/shell scripting, λ, LaTeX

Analysis Techniques and Tools

Image and signal processing, Ensemble learning, PCA/SVD, Embedding and dimensionality reduction, Gaussian Processes, Fourier and basis transforms, convolutional neural networks with TensorFlow/keras, scikit-learn

FPGA Design

Matlab/Simulink, VHDL, Xilinx ISE, Altera Quartus

Electronics and Mechanical Lab

Digital hardware setup, board and analogue component testing, soldering, can operate lathes, mills, and presses