Luke Hart

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Summary

- Pro-active and creative software developer and researcher with skills and experience in mathematics, astrophysics and statistics
- Led research culminating in several publications in high impact astronomy journals
- Experience writing software package for numerical simulations and statistical analysis (e.g. PCA, MCMC)
- Efficient tutoring experience of over 5 years with adaptive style of mentoring ideal for training
- Over 5 years of experience in OOP with Python, C++, Fortran using Unix, Linux and version control
- Professional in teams, independently and as a leader, with keen attention to detail and punctuality

Career History

TNEI *August 2021 -*

Software Engineer

Primary developer of the IPSA power systems software, with a focus on developing new numerical modules for clients. Chief contact and troubleshooter on licensing software and modifications of source codes, improving the UI/UX for clients. All developments include source code written in *C++* and *Fortran* with scripting in *Python* and UI framework based on *Qt*.

Jodrell Bank Center for Astrophysics *May 2020 - August 2021*

Postdoctoral Research Associate

Independent research into variety of topics surrounding the cosmic microwave background. Lead author on forecasting paper for recombination spectral distortions predicted by futuristic ESA missions such as *Voyage 2050*. Developed further principal component analysis applications (see FEARec) with non-standard physics models in the early universe. Co-wrote a proposal forecasting for non-standard physics variations with spectral distortions using future missions and co-ordinated the first spectral distortions Wikipedia page. Primary tutoring for second year undergraduate physics students focussed on weekly tutorials.

Technical Skills

Mathematical Skills ODE/PDE solving, linear regression, Monte Carlo simulations, PCA, matrix decomposition problems

Computer Languages C/C++, Python, Fortran, bash, LaTeX, PowerShell, XML/YAML, Markdown

Software and Tools Numpy, Matplotlib, Multiprocessing (mp), Pandas, Scipy, Eigen, Mathematica, XMGrace, Git, IPSA, Qt

Teaching

Undergraduate Personal Tutor, **Second Year Undergraduate Teaching** *Manchester, 2020 - 2021*
Computing Lab (C++) Demonstrator, **Object Oriented Programming in C++** *Manchester, 2019*
Working Teaching Co-ordinator, **First Undergraduate Teaching** *Manchester, 2016 - 2018*

Education

Jodrell Bank Center for Astrophysics, University of Manchester *2016 - 2020*

- Ph.D. in Astronomy and Astrophysics (Theoretical Cosmology) *Manchester, UK*
  - *Probing the Recombination History with CMB Anisotropies and Spectral Distortions*
- Supervised by Jens Chluba
- Resulted in 3 first author publications and contributions to the *Voyage 2050* ESA Proposals
- Attended 4 conferences as a speaker and co-ordinated a conference for students at JBCA

University of Manchester *2012 - 2016*

- M.Phys in Physics (1st Hons.) *Manchester, UK*
- Masters Project supervised by Sarah Bridle, Joe Zuntz and Michael Troxel
  - *Disentangling Modified Gravity from Intrinsic Alignments in Weak Gravitational Lensing*
- Student internship with Richard Battye in 2015 focussing on Monte Carlo techniques within cosmology

Publications

See List of Publications.

Other Experience

University of Manchester Cancer Research UK Society (CRUKSoc) *2013 - 2016*
Chairman and Founder
Primary organiser and co-ordinator of the first CRUK society at the University of Manchester. Led variety of fundraisers such as concerts, comedy nights and quiz nights. Raised over £20,000 managing the society of over 200 members.

Jodrell Bank Center for Astrophysics Postgraduate Committee *2018*
Chairman
Communicating any academic issues/logistic problems (i.e. short-term teaching contracts) to managers and responsible for the wellbeing movement within the Department of Physics and Astronomy, 2016 - 2018.

Service

Journal Referee *MNRAS, Physical Review, EPJ, JCAP 2020 - 2021*
Physics Representative at School of Physics and Astronomy *University of Manchester, 2012 - 2020*