

# 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