Aoife Catherine Simpson

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Summary

Final year Astrophysics PhD student with 5+ years of experience using programming with an emphasis on fitting statistical models to data. As of May 2023, I will be available for full-time employment (40+ hours).

Education

- **University of Cambridge** — Cambridge, UK
  Doctor of Philosophy in Astrophysics — *Oct 2019 - present*
  Thesis Title: The Properties of gravitationally Lensed Quasars
- **University of Hertfordshire** — Hatfield, UK
  Master of Physics in Astrophysics; 1st Class Degree — *Sep 2014 - May 2019*
  courses: Statistics and programming, computational physics, dynamics and geometry, differntial equations, partial differential equations.

Skills Summary

Languages

- **Python** (including: *NumPy, Matplotlib, Pandas, Seaborn, Scikit Learn*) introduced and developed through undergraduate, PhD studies and Datacamp Data Scientist with Python Careers Track
- **R** knowledge learnt through the Datacamp Quantitative Finance Career Track (in progress)
- **SQL** knowledge developed through the Datacamp SQL Fundamentals Track (in progress)

Software and Systems

- LaTeX, Microsoft Suite, Google Sheets, Google Docs, Jupyter Notebook, GIT
- Linux and macOS

Communication and Interpersonal Skills

- Excellent Communication skills refined through PhD presentations and outreach
- Ability to lead and manage projects throughout my PhD
- Decision making and problem solving skills advanced through PhD, undergraduate projects and Summer internships

PhD Thesis

Produced a database of the properties of gravitationally lensed quasars, a product of general relativity, where a distant background object is magnified by massive foreground object. This involved developing new pipelines which fit models to the data for 200+ objects using MCMC (Markov chain Monte Carlo) methods to determine their properties. This database is an asset to the astronomical community, allowing follow up observations to be performed more easily.

Experience

- **University of Surrey** — Guildford, UK
  SEPnet Summer Placement - Dr Noelia Noel — *Jul 2018 - Aug 2018*
  - **Project Management**: Collaborated with a team of 2+ PhD students to investigate dwarf galaxy quenching.
  - **Data Analysis and Communication**: Used Python to Obtain and clean data for each galaxy from many different journals articles and produced a comparison. Presented the results on a poster at the SEPnet Placement Expo conference where it won the best poster.
- **University of Hertfordshire** — Hatfield, UK
  Research Assistant - Prof. Phil Lucas — *Jul 2017 - Aug 2017*
  - **Project Management**: Investigated the detection and characterisation of extremely variable Young Stellar objects in the VISTA Variables in the Via Lactea dataset.
  - **Data Analysis**: Used Python and Topcat to clean and investigate the variability of different objects and flag any that were extremely variable. This included working with big data sets and writing and debugging different python codes to download and clean the data.

Academic Projects

- **Master's Thesis - Exploring The Molecular Chemistry Of A Galaxy At The Peak Of Cosmic Star Formation And Black Hole Growth (Python Programming)**:
  Used reduced data cubes from 3 bands of ALMA (Atacama Large Millimeter Array) observations to investigate how the dust temperature varies across the galaxy and determine if the central supermassive black hole is affecting the star formation. Implemented MCMC techniques to fit models to the data to determine the dust temperature of each pixel. 'Concluded that the central supermassive black hole does not have much of an effect on the star formation and that this galaxy has a really high star formation rate of 2500 solar masses per year.
- **Third Year Thesis- Exoplanet Transis at Bayfordbury Observatory (Microsoft Excel)**: I Incorporated the University of Hertfordshire's Bayfordbury observatory to show that oexoplanet transits could be observed from much smaller telescopes. Determined which exoplanets would be visible and the exact time and lengths of the transits. Produced telescope proposals for the observatory to setup remote observing for each transit. Analyzed data using Excel to determine the transit depths and therefore the size of the exoplanets. This was a proof of concept project.

Awards

- STFC PhD Studentship *Oct 2019*
- Vice Chancellor's Awards Student of the Year *Jun 2019*
- Best Poster at SEPnet Placement Expo *Nov 2018*
- Chris Kitchin Award for Best Use of Bayfordbury Observatory *Jun 2018*
- Best New Planetarium Presenter *May 2017*

Publications

- **Simpson A. C.**, Auger-Williams M. W., McMahon R. G. (in prep - expect to submit Jan 2023)
  Spectrscopic Properties and Supermassive Black Hole Masses for ∼ 200 Gravitationally Lensed Quasars
- **Simpson A. C.**, Auger-Williams M. W., McMahon R. G. (in prep - expect to submit Nov 2022)
  Photometry and Lens Modelling for ∼ 200 Gravitationally Lensed Quasars

Academic Presentations

- **European Astronomical Society Annual Meeting** *Valencia Conference Centre, Valencia, Spain* *Jun 2022*
  'Photometry and Lens Modelling for ∼ 200 Gravitationally Lensed Quasars'
- **Wednesday Seminar Series** *Institute of Astronomy, University of Cambridge* *May 2021*
  'Exploring Supermassive Black Holes and their Host Galaxies Magnified by Cosmic Lenses'

Leadership

- **Extragalactic Group Meeting Organiser** *Oct 2020 - present*
  Organises and chairs fortnightly research group meetings which involves reaching out to external and internal speakers to discuss their work.
- **Equality, Inclusion and Diversity Committee** *Nov 2019 - present*
  Pass on any issues/suggestions between the committee and the postgraduate students. Lead the initiative to create a department postgraduate student well-being network.
- **International Women's Day 2022** *May 2021 - Mar 2022*
  Planned and operated an academic career jobs Q&A session as part of International Women's Day 2022. Contacted panellists and answered any queries they might have.
- **'Meet the Speaker' Organiser** *Oct 2020 - May 2021*
  Chaired weekly QA with invited colloquium speaker and the postgraduate students.
- **Supervision of Part II (Third Year) Students** *Jan 2020 - Jun 2022*
  Supervised 4 pairs of Part II students in the Observational Astrophysics course. This involved marking and giving feedback on work and going through any problems during the session. Prepared extra material in case students did not find the problem sheets difficult.
- **University of Hertfordshire Outreach Ambassador** *Sept 2015 - May 2019*
  Written and presented 50+ planetarium shows to a variety of audiences from children to adults with varying levels of expertise.

Referees

Dr Matthew Auger-Williams *Senior Reseach Fellow* Institute of Astronomy, University of Cambridge, CB3 0HA
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