Jason Shingirai Makechemu

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Education

Lancaster University Sept 2023 – Present
Ph.D. Astrophysics (Fully Funded, Faculty of Science and Technology)

The focus of my PhD is the application of computational and observational techniques to address questions related to star formation across different astrophysical regimes. A non-exhaustive list of what some of my research includes are utilising observations across the electromagnetic spectrum; as well as performing dynamical modelling, and using machine learning tools to find patterns in large astronomical datasets. Supervisor: Prof. Brooke Simmons.

Aberystwyth University Sept 2020 – June 2023
BSc (Hons) Astrophysics — First Class

Final year project: *Inferring Behavioural Properties of the Solar Atmosphere and Earth's Atmosphere Due to Disturbances in the Geomagnetic Field*, using ground-based magnetometer data. Supervisor: Dr. Heather McCreadie.

Grants and Awards

June 2022	**Turing Grant** (UK Government) Funding for international research opportunities; used for research internship at Paris-Saclay (June–August 2022).	£960
September 2022	**Peter Hancock Scholarship**, Aberystwyth University Supported graduate school applications, research tools, and living costs.	£4,400
May 2024	**IAU Grant** Travel support to present research at the IAU General Assembly, Cape Town.	€800

Experience

President — Zimbabwean Astronomical Society April 2024 – Present

- Developing astronomy outreach and education programmes for Zimbabwean scientific organisations and educational institutions.
- Organising seminars, workshops, and STEM education classes.

Astrophysics Research Assistant — University of Oxford June – August 2023
Supervisor: Dr. Thomas Williams

- Used ALMA CO observations and stellar mass modelling to calculate the Toomre Q parameter in nearby gas-rich quiescent galaxies.
- Investigated molecular cloud fragmentation and star-formation triggering mechanisms.

Summer Research Internship — L'Institut de Physique Théorique (CEA Paris-Saclay)
June – August 2022
Supervisor: Dr. Natalie Hogg

- Simulated strongly lensed Type-Ia supernovae and their observational appearance.
- Produced a detailed report on mathematical and computational methods.

Summer Research Project — Aberystwyth University June – July 2021
Supervisor: Dr. Tony Cook

- Conducted lunar flash detection observations and data analysis using ALFI and Microsoft Excel.
- Distinguished genuine lunar impact flashes from false positives.

Selected Talks and Seminars

- **Durham–Edinburgh eXtragalactic Workshop (DEX)**, Durham, UK (Jan 2024)
  Talk: *Deep-learning classifications of galaxy morphologies in large JWST surveys.*
- **AGN Across Continents**, Durham, UK (July 2024)
  Talk: *Deep-learning classifications of galaxy morphologies in large JWST surveys.*
- **University of Oxford**, Oxford, UK (July 2024)
  Seminar: *Why Quiescent Galaxies Don't Form Stars; Deep-learning classifications of galaxy morphologies in large JWST surveys.*
- **IAU General Assembly**, Cape Town, South Africa (Aug 2024)
  Talk: *Deep-learning classifications of galaxy morphologies in large JWST surveys.*
- **Ethiopia Space Science and Geospatial Institute**, Addis Ababa (Aug 2024)
  Seminar: *Introducing the Zimbabwean Astronomical Society; Deep-learning classifications of galaxy morphologies.*
- **Durham–Edinburgh eXtragalactic Workshop (DEX)**, Durham, UK (Jan 2025)
  Talk: *Evaluating the Role of the Toomre Q Parameter in the Gas Stability of Early-Type Galaxies.*
- **African Astronomical Society Conference**, Pretoria, South Africa (Mar 2025)
  Seminars and poster presentation on JWST AGN populations and gas dynamics.

Observing Experience

Roque de los Muchachos Observatory, La Palma, Spain Oct 2023

- Five nights of spectroscopic observations targeting Hα, Dn4000, and [OIII] in nearby spiral galaxies.
- Data used to measure star formation rates within and outside galactic bars.

Publications

First Author

- Makechemu et al. (2026), *ApJ*: The Limitations of Radio Continuum as a Star Formation Tracer (submitted).
- Makechemu et al. (2026), *MNRAS*: Evaluating the Role of the Toomre Q Parameter in the Gas Stability of Early-Type Galaxies (submitted).
- Makechemu et al. (2026), *MNRAS*: Galaxy Zoo JWST: Uncovering a Hidden Population of Obscured AGN between $2 < z < 4$ (in prep).

Co-Author

- Huertas-Company et al. (2025), *ApJ*: Galaxy Zoo CEERS: Bar Fractions up to $z \sim 4.0$.
- Géron et al. (2025), *ApJ*: Galaxy Zoo CEERS: Bar Fractions up to $z \sim 4.0$.
- Smethurst et al. (2025), *MNRAS*: Galaxy Zoo JWST: Featureless Discs at $3 < z < 7$.
- Walmsley et al. (2024), *ECCV*: Scaling Laws for Galaxy Images.
- Mantha et al. (2024), *Citizen Science Theory and Practice*.

Outreach

- Institute of Physics & Aberystwyth University outreach event (March 2022): Presentation on exoplanets and the search for life.
- Independent science communication (Jan–Nov 2022): Astronomy and physics content on TikTok (`@jsmakechemu`) and YouTube.

Skills

Technical: Python, Machine Learning, TOPCAT, LaTeX, HTML, CSS, Microsoft Office
Languages: English (Native), Shona (Intermediate), Arabic (Intermediate), Amharic (Beginner)
Other: Competitive tennis, jiu-jitsu, self-taught piano

Collaborations

Galaxy Zoo
COSMOS

Professional Memberships

African Astronomical Society (AfAS)
Institute of Physics (IOP)
Royal Astronomical Society (RAS)
Zimbabwean Astronomical Society (ZAS)

Referees

Prof. Brooke Simmons
Lancaster University, UK
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Prof. James Chibueze
University of South Africa, Johannesburg, South Africa
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Dr. Thomas Williams
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