DR MATTHEW BATTLEY

Postdoctoral Researcher, University of Geneva

matbatt@gmail.com +44-7490-577663 Geneva, Switzerland
Observatoire de Genève, 51b Chemin Pegasi, 1290 Versoix, Switzerland mbattley.github.io/
mpbattley mbattley

RESEARCH EXPERIENCE

Postdoctoral Researcher

Geneva Observatory, University of Geneva

Oct 2022 – Present Geneva, Switzerland

- **Supervisor:** Assistant Professor Monika Lendl
- **Research:**
  The discovery and characterisation of exoplanets, primarily focused on young and active systems. Projects include the continued search for new young exoplanets in photometry, spectroscopic follow-up of young exoplanet candidates, full system analyses for a long-period exoplanet and young low-mass eclipsing binary, ephemeris maintenance and stellar activity analyses. This research frequently makes use of Python coding, photometric, spectroscopic and statistical analyses, database manipulation, and exoplanet/stellar activity modelling. It utilises a wide range of data from *TESS*, *Kepler/K2*, *NGTS*, *Gaia*, *Coralie* and *HARPS*.

PhD Student

Department of Physics, University of Warwick

Oct 2018 – Sep 2022 Coventry, United Kingdom

- **Supervisor:** Professor Don Pollacco
- **Funding:** Chancellor's International Scholarship (Warwick)
- **Thesis:** "Tracing exoplanets through time with *TESS*".
  This research primarily focused on searching for new planets around young (<1Gyr) active stars in photometric data. This included the design of young-star-specific detrending methods for photometric data and analysis/searches through a range of data sources such as *Gaia*, *TESS*, *Kepler* and *NGTS*, alongside utilising machine-learning based techniques to classify, understand and detrend challenging stellar activity.

Research Assistant

Centre for Advanced Composite Materials, University of Auckland

Jan 2018 – June 2018 Auckland, New Zealand

Responsibilities:

- Thermo-mechanical modelling, analysis and testing of two novel wireless charging systems in development at CACM, in collaboration with a large overseas company.

Summer Research Student

Centre for Advanced Composite Materials, University of Auckland

Dec 2016 – Feb 2017 Auckland, New Zealand

Responsibilities:

- Design and analysis of a novel small-scale inductive power transfer system. This included numerical modelling of the coupled thermal and electromagnetic physics of the system, prototype design and laboratory testing

RESEARCH OVERVIEW

I am a Postdoctoral Researcher at Geneva Observatory (University of Geneva), supervised by Assistant Professor Monika Lendl. My main research focus is the discovery and characterisation of exoplanets around young stars. I have extensive experience with Python coding, analysis of photometric and spectroscopic data, exoplanet modelling and stellar activity analysis, alongside experience in machine learning and vetting of exoplanet candidates. I also have significant experience writing telescope proposals, having been both a PI and Co-I on numerous proposals for TESS, JWST, OPTICON and ESO telescopes.
Alongside my PhD in astrophysics, I also hold a mechanical engineering degree with a wide range of experience in the design, modelling, manufacturing and testing of complex systems, including rocket components and inductive charging technology.

EDUCATION

Ph.D. in Astrophysics

University of Warwick, UK

October 2018 – September 2022

Supervisor: Prof Don Pollacco
Project: Tracing exoplanets through time with *TESS*

BE(Hons)/BSc in Mechanical Engineering/Physics

University of Auckland, NZ

March 2013 – November 2017

Grade: 1st Class Honours
Specialisations: Astrophysics, mechanical and thermal design, geophysics

Schooling

Mount Albert Grammar School, NZ

Jan 2008 – Dec 2012

NZQA Scholarships in Physics, Calculus, Statistics and English
NCEA Level 3 with Excellence
NCEA Level 2 with Excellence
NCEA Level 1 with Excellence
Subjects: Physics, Calculus, Statistics, Chemistry, English, History

Student Intern

Fisher & Paykel Healthcare Ltd

Dec 2015 – Feb 2016 | Auckland, New Zealand

Responsibilities:

- Detailed design and development of a small scale humidification prototype for use in CPAP therapy
- Testing and communication of results verbally/through reports
- Significant use of Computer Aided Design software
- Investigation into novel alternate materials

Propulsion Intern

Rocket Lab Ltd

Dec 2013 – Feb 2015 | Auckland, New Zealand

Two related 3-month internships:

- **December 2013 – February 2014**: Design, manufacture and initial testing of a miniature turbopump, part of the rocket propulsion system
- **December 2014 – February 2015**: Continued pump development, optimization of rocket trajectories and compiling a report for a specific rocket configuration

Responsibilities:

- Understanding physics of turbopump operation and developing design calculations for simple and complex designs
- Establishing and developing design layouts for a centrifugal pump
- Considerable Computer Aided Design for complex geometries
- Communicating with manufacturers to obtain specific pieces
- Prototype testing to specification and endurance
- Report writing and communication of results

TEACHING EXPERIENCE

Masters Project Supervisor

University of Geneva

Feb 2023 – Present | Geneva, Switzerland

Responsibilities:

- Primary supervision of two masters-level students
- Project design, providing general guidance and marking

Lab Demonstrator

University of Warwick

Oct 2018 – Oct 2021 | Coventry, United Kingdom

Responsibilities:

- Guiding independent learning of second-year undergraduate physics students through hands-on laboratories
- Explaining new techniques, concepts and specialist equipment

Private Tutor

Ardent Education

March 2013 – July 2018 | Auckland, New Zealand

Responsibilities:

- Tutoring School and undergraduate University students in mathematics, physics, statistics and general engineering
- Planning lessons, explaining concepts and setting problems

SKILLS

Excellent written/spoken communication | Eye for detail | Multidisciplinary knowledge | Hard-working | Persistent | Committed | Driven | Adaptable | Leadership Qualities | Conscientious worker alone and in teams

ACCEPTED PROPOSALS

As Primary Investigator:

2024 | **HARPS/NIRPS - ESO P113**
5.5 nights | "Assembling a sample of young planets in the Hot-Neptune desert"

2023 | **CARMENES - OPTICON2024A**
3.5 nights | "Constraining the masses of key young Hot Jupiter planet candidates"

As Co-Investigator:
As part of wider collaborations I have been involved in numerous additional programs on state-of-the-art observing facilities, including:

HARPS: 140.75 nights
ESPRESSO: 12.2 nights
NIRPS: 2.5 nights
TNG: 2 nights
CHEOPS: 93 orbits
TESS: 3 successful guest proposals

AWARDS

Chancellor's International Scholarship (2018)
Awarded to the most outstanding incoming international PhD students at the University of Warwick

Heavy Engineering Research Association Prize (2016)
Awarded for the best final year project in Mechanical Engineering

First in Course Awards (2014/2016/2017)
Awarded to the top student in Physics 213, Physics 330 and MECHENG 700 at the University of Auckland

COMPUTING

Python | Matlab | C++ (basic) | Microsoft Office | LaTeX | Libre Office | Solidworks | Creo Parametric | ANSYS | ABAQUS FEA | TOPCAT

SCIENTIFIC PRESENTATIONS

Talks & Seminars
2023 | **"The YOUNGSTER Program"**
Planet-S Junior Researchers' Assembly, Leissigen, Switzerland
2022 | **"Tracing exoplanets through time with TESS"**
Geneva exoplanet seminar, Geneva Observatory, Switzerland
2021 | **"Revisiting the Kepler Field with TESS"**
TESS Science Conference 2, MIT, USA
2021 | **Tracking Exoplanets through Time with TESS"**
UK Exoplanet Community Meeting, University of Birmingham, UK
2021 | **"The Curious Case of Young Exoplanets: Unlocking the secrets of young exoplanets with multi-instrument observations"**
StScI Summer Symposium, STScI, USA
2019 | **"Fantastic Planets and How to Find Them"**
ACORNS, University of Warwick, UK
2019 | **"The Curious Case of Exoplanet Teenagers"**
Warwick AstroSoc Symposium, University of Warwick, UK

Poster Presentations
2021 | **"The YOUNGSTER Program"**
Sagan Exoplanet Summer Workshop, Caltech, USA
2020 | **"A search for Young Exoplanets in the S1-5 TESS FFIs"**
Exoplanets III, University of Heidelberg, Germany
2020 | **"Searching for Young Exoplanets with TESS"**
"Extreme Precision Radial Velocity", 2020 Sagan Exoplanet Summer Workshop, California Institute of Technology, USA
2019 | **"Searching for Young Planets with TESS"**
PLATO Science Meeting 2019, University of Warwick, UK

PUBLICATIONS

First-author journal articles

Three published, one submitted + one additional paper in prep.
NGTS-30 b/TOI-4862 b: An adolescent 98-day transiting warm Jupiter recovered from one and a half transits
Battley, M.P., et al., submitted
YOUNG Star detrending for Transiting Exoplanet Recovery (YOUNGSTER) – II. Using self-organizing maps to explore young star variability in sectors 1–13 of TESS data
Battley, M.P., Armstrong, D.J & Pollacco, D. (2022), MNRAS, 511, 3
Revisiting the Kepler field with TESS: Improved ephemerides using TESS 2min data
Battley, M.P., et al., (2021), MNRAS, 503, 2
A search for young exoplanets in Sectors 1-5 of the TESS FFIs
Battley, M.P., Pollacco, D. & Armstrong, D.J. (2020), MNRAS, 496, 2

Co-authored journal articles

16 published articles as co-author, including:
Early Release Science of the exoplanet WASP-39b with JWST NIRCam
Ahrer, E.-M. et al. (2023), Nature, 614, 7949
A Mini-Neptune from TESS and CHEOPS Around the 120 Myr Old AB Dor Member HIP 94235
Zhou, G. et al. (2022), AJ, 163, 6
BEBOP III. Observations and an independent mass measurement of Kepler-16 (AB) b - the first circumbinary planet detected with radial velocities
Triaud, A.H.M.J. et al. (2022), MNRAS, 511, 3
HD 213885b: a transiting 1-d-period super-Earth with an Earth-like composition around a bright (V = 7.9) star unveiled by TESS
Espinoza, N. et al. (2020) MNRAS, 491, 2

OBSERVING

Observatoire de Haute-Provence (OHP)
SOPHIE echelle spectrograph | 13 nights
Observing as part of the SOPHIE timeshare, aiding the search for circumbinary planets.

ESO La Silla Observatory (remote)
CORALIE spectrograph; EulerCAM | 9 nights
Spectroscopic and photometric observations for Geneva's 1.2m Leonhard Euler telescope, including my own program following up young transiting exoplanet candidates.

Upcoming:
ESO La Silla Observatory (remote)
HARPS/NIRPS spectrographs | 9 nights
Observer for Geneva programs on HARPS/NIRPS spectrographs on the la Silla 3.6m telescope for the P112 observation period.

EQUALITY/DIVERSITY

2022-2024 | **University of Geneva**
Member of the Diversity, Equality and Inclusion committee at Geneva Observatory, including organising DEI events and monitoring DEI issues at the observatory.

OUTREACH

2023 | **Fantasy Basel**
Exhibitor for Planet-S (Swiss exoplanet/planetary science consortium), providing public demonstrations and planetarium shows for the general public .

2022 - 2023 | **Observatoire de Genève**
Outreach tours of the observatory for both visiting schools and the general public, as well as planetarium shows for open days.

2020 | **Warwick Knowledge Centre**
Composed a brief public outreach article for the online University of Warwick Knowledge Centre entitled *"Myths and Legends of the Pleiades"*

2018 - 2022 | **Planetarium**
Visited a number of different primary schools in the local area with the inflatable Warwick planetarium to show children presentations about the hunt for exoplanets and alien life. Also attended public Q&A sessions at these schools.