Luke Titus Parker

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DPhil (PhD) Student, University of Oxford, UK

Research Interests

- Characterization of exoplanet atmospheres including chemistry, dynamics, and formation;
- Developing novel uses of high resolution spectroscopy and testing preparatory science for the ELT;
- Metal enrichment and haze formation in warm Sub-Neptune atmospheres;
- The observability of outgassed and vaporised atmospheres on ultra-hot super-Earths with high and low-resolution spectroscopy.

Education & Research

DPhil Astrophysics - University of Oxford, UK — 2022 - Present

PhD Thesis: *A high-resolution view of extreme exoplanet atmospheres*, Supervisor: Jayne Birkby

MPhys Physics & Astronomy, 1st Class Honours - Durham University, UK — 2018 - 2022

Master's Thesis: *Searching for nova shells in IGAPS*, Supervisor: Simone Scaringi
(Received the J.A. Chalmers Thesis Prize in Physics and Astronomy)

Undergraduate Thesis: *Verification of TOI 2040.01, A TESS Hot Jupiter Candidate*, Supervisor: Mark Swinbank
(Received the Florence Nightingale Prize for Graphical Excellence)

HARMONI Research Internship - University of Oxford, UK — 2021

Calibrating the Spectra of Arc Lamps for HARMONI/ELT Wavelength Calibration, Supervisor: Niranjan Thatte

Observing Programmes

PI CRIRES+/VLT(8.2m), **8.1 h** *(Tracing the formation history of super-Jupiters with novel silicate abundance ratios in the M-band)*	2024
Co-PI CRIRES+/VLT(8.2m), **7.2 h** *(Peering through the clouds: detecting SiO in the atmosphere of a young giant exoplanet)*	2024
Co-I CRIRES+/VLT(8.2m), **6.5 h** *(Investigating the role of atmospheric metallicity in inflating the hot Jupiter WASP-193b)*	2024
Co-I MUSE/VLT(8.2m), **16.3 h** *(Unravelling the nature of J0528+2838 - bow-shock or a nova shell?)*	2023

Conferences & Talks

Poster - Exoclimes VII, Montreal, CA	Jul 2025
Contributed Talk - HR by the Sun, Nice, FR	Jan 2025
Contributed Talk - Two HoRSEs, Berlin, DE	Apr 2024
Contributed Talk - UKEXOM 2024, Birmingham, UK	Apr 2024
Splinter Talk - Exoplanets V, Leiden, Nl	Jun 2024
Poster - Exoplanets V, Leiden, Nl	Jun 2024
Contributed Talk - UKEXOM 2024, Birmingham, UK	Apr 2024
Contributed Talk - Rocky Worlds III, Zurich, CH	Jan 2024
Poster - The Sagan Summer Workshop, Pasadena, USA	Jul 2023
Contributed Talk - National Astronomy Meeting, Cardiff, UK	Jul 2023
STFC Summer School, Dundee, UK	Aug 2022
Spatially resolved Spectroscopy with ELTs, Oxford, UK	Jun 2021

Teaching

Tutor for Stellar Astrophysics and Galaxies (4th year), 1:4 teaching ratio	2025
Tutor for Cosmology (4th year), 1:4 teaching ratio	2024

Outreach & Engagement

Radcliffe Observatory open doors (∼1000 attendees) outreach event, Oxford, UK	2024
Talk to summer school students: 'PhDs in Astrophysics', Oxford, UK	2023 - 2024
Into the Cosmos (∼800 attendees) outreach event, Oxford, UK	2023
Panel member 'PhDs at Oxford', Oxford, UK	2022 - 2024

Professional activities

Graduate representative (staff-student liaison)	2023 - 2024
Organiser, Astrophysics colloquium speaker-student lunch	2023 - 2024
Collaboration meeting chair, Oxford-Warwick high resolution spectroscopy	2022 - 2023

Awards & Prizes

J.A. Chalmers Thesis Prize in Physics and Astronomy	2022
Advanced Astrophysics module prize	2022
Durham University Physics Outstanding Achievement	2022
The Florence Nightingale Prize for Graphical Excellence	2021
The Physics & Mathematics Alumni Award, Trevelyan College	2020

Grants & Funding

Graduate student grant, Sagan Summer Workshop, JPL	2023
Graduate student grant, Exoclimes VI, Exeter	2023
Joint Brasenose College & Astrophysics DPhil Studentship	2022

Publications

First Author:

[2] **Parker, Luke T.**; Mendonça, João M. ; Diamond-Lowe, Hannah ; Birkby, Jayne L. ; Meech, Annabella ; Vaughan, Sophia R. ; Brogi, Matteo ; Fisher, Chloe ; Buchhave, Lars A. ; Bello-Arufe, Aaron ; Kreidberg, Laura ; Dittmann, Jason, *Limits on the atmospheric metallicity and aerosols of the sub-Neptune GJ 3090 b from high-resolution CRIRES+ spectroscopy*, **2025**, eprint arXiv:2503.16608. 2025arXiv250316608P

[1] **Parker, Luke T.**; Birkby, Jayne L.; Landman, Rico; Wardenier, Joost P.; Young, Mitchell E.; Vaughan, Sophia R.; van Sluijs, Lennart; Brogi, Matteo; Parmentier, Vivien; Line, Michael R., *Into the red: an M-band study of the chemistry and rotation of β Pictoris b at high spectral resolution*, **2024**, MNRAS, 531, 2356. 2024MNRAS.531.2356P.

References

Prof. Jayne Birkby, Astrophysics, University of Oxford, jayne.birkby@physics.ox.ac.uk