

Sophia Vaughan



DPhil (PhD) Student

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RESEARCH INTERESTS

- The characterisation of exoplanet atmospheres at high spectral resolution.
- Biosignatures, technosignatures and the search for extraterrestrial life.

EDUCATION

2020-	DPhil Astrophysics Oxford University, St John's College Thesis: <i>Reflected light from exoplanet atmospheres: towards rocky worlds</i> Supervisors: Prof Jayne Birkby and Prof Raymond Pierrehumbert
2016-2020	MPhys Physics, 1st Class Honours, 8th highest score in the year Oxford University, St John's College Masters Project: <i>Detection of Transiting Exoplanets with the TESS Space Mission</i> Supervisor: Prof Suzanne Aigrain

RESEARCH EXPERIENCE

2020-	Oxford University Astrophysics DPhil, Supervisor: Prof. Jayne Birkby Worked on high spectral resolution techniques for characterising exoplanets in reflected light.
2019-2020	Oxford University Master's Project, Supervisor: Prof. Suzanne Aigrain Worked on using Gaussian Processes to model stellar spectra and measure stellar radial velocities.
2019	Joint Institute of VLBI - ERIC (JIVE), Supervisor: Prof. Huib Jan van Langevelde Worked on inverse phase referencing of MASERs using the Common Astronomy Software Applications package.
2018	Oxford University Astrophysics Summer Project, Zooniverse team, Supervisor: Dr Helen Spiers Worked with the Zooniverse team on public outreach projects.

TELESCOPE OBSERVATIONS

VLT(16.4m)/ESPRESSO	PI	2023B	2.5 nights	VM/dVM	<i>Mirror in the Desert: a high resolution reflection spectrum of the unusual ultra hot Neptune LTT-9779 b</i>
VLT(8.2m)/CRIRES+	Co-I	2023B	6.6 hours		<i>A Desert Island: Probing the Origins of the Desert with Atmospheric Transmission of a Hot Neptune</i>
VLT(8.2m)/ESPRESSO	Co-I	2022B	30 hours		<i>Through the Looking Glass: a high resolution ESPRESSO survey of exoplanet reflection spectra</i>
VLT(8.2m)/CRIRES+	Co-I	2022A	8 hours	dVM	<i>Revealing an atmosphere shrouded in mystery with high-resolution spectroscopy</i>

DATA ANALYSIS EXPERIENCE

VLT(8.2m)/ESPRESSO	Data	Experience in analysing high-resolution spectroscopy observations of exoplanets in reflected light and of the unique challenges this poses.
VLT(16.4m)/ESPRESSO	Data	Experience in analysing high-resolution spectroscopy observations of exoplanets in reflected light with the 4UT mode and the differences between this and single UT mode.
VLT(8.2m)/CRIRES+	Simulation	Experience in simulating high-resolution spectroscopy observations of exoplanets (transit and emission) and analysing them to verify the observational requirements for observing proposals.
VLT(8.2m)/ESPRESSO	Simulation	Experience in simulating high-resolution spectroscopy observations of exoplanets (reflection) and analysing them to verify the observational requirements for observing proposals.
ELT(39m)/HARMONI	Simulation	Experience in simulating spatially resolved observations of exoplanets (reflection) and analysing them using the 'molecule mapping' method to determine science cases for the present instrument design.

TEACHING EXPERIENCE

Astrophysics TA, Department of Physics, University of Oxford, UK	2022
Atmospheric Physics Marker, Department of Physics, University of Oxford, UK	2023
Waynflete Studies Programme tutor, Magdalen College School, Oxford UK	2023

GRANTS, HONOURS AND AWARDS

Gibbs Prize, Department of Physics, University of Oxford, UK	2019	£200
Gibbs Prize, Department of Physics, University of Oxford, UK	2018	£150
Casberd Scholarship, St. John’s College, University of Oxford, UK	2017-2022	£300/yr

CONFERENCES

Exoplanets Atmospheres to Architectures	Washington, US	Contributed Talk	Sep 2023
Exoplanets by the Lake	Munich, Germany	Contributed Talk	Aug 2023
Science with the Habitable Worlds Observatory and Beyond	Baltimore, US	Contributed Talk	Jul 2023
National Astronomy Meeting	Cardiff, UK	Contributed Talk	Jul 2023
Optimal Exoplanet Imagers	Leiden, Netherlands	Workshop	Feb 2023
National Astronomy Meeting	Warwick, UK	Contributed Talk	Jul 2022
Rocky Worlds II	Oxford, UK	Contributed Talk	Jul 2022
Spirit of Lyot	Leiden, Netherlands	Poster	Jul 2022
Exoplanets IV	Las Vegas, US	Poster	May 2022
Spatially Resolved Spectroscopy with Extremely Large Telescopes	Oxford, UK	Poster	Sep 2021
EAS Annual Meeting	Online	Poster	Jul 2021
STScI Spring Symposium	Online	Poster	Apr 2021
Habitable Worlds	Online	Poster	Feb 2021

CONTRIBUTIONS TO ACADEMIA

Organisation of Scientific Meetings	
SOC of breakout session at UK National Astronomy Meeting	Jul 2022
Major International Collaborations and Consortia	
HARMONI consortium?	???

PRESS RELEASES AND OUTREACH

Outreach	Passport to the Solar System, Oxford, UK	Volunteer	Jun 2021
Outreach	Into the cosmos, Oxford, UK	Volunteer	Jan 2023
Press	Commentary: Sophia Vaughan on searching for an exo-rainbow	Commentary	Jul 2023

LANGUAGES

Computing: Python, LaTeX and bash. Basic knowledge of: AIPS and Matlab
Spoken: English (native)

REFERENCES

Prof Jayne Birkby	University of Oxford	jayne.birkby@physics.ox.ac.uk
Dr. Matthew Kenworthy	Universiteit Leiden	kenworthy@strw.leidenuniv.nl
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PUBLICATIONS

First Author:

[1] Sophia R. Vaughan, Timothy D. Gebhard, Kimberly Bott, Sarah L. Casewell, Nicolas B. Cowan, David S. Doelman, Matthew Kenworthy, Johan Mazoyer, Maxwell A. Millar-Blanchaer, Victor J. H. Trees, Daphne M. Stam, Olivier Absil, Lisa Altinier, Pierre Baudoz, Ruslan Belikov, Alexis Bidot, Jayne L. Birkby, Markus J. Bonse, Bernhard Brandl, Alexis Carlotti, Elodie Choquet, Dirk van Dam, Niyati Desai, Kevin Fogarty, J. Fowler, Kyle van Gorkom, Yann Gutierrez, Olivier Guyon, Sebastiaan Y. Haffert, Olivier Herscovici-Schiller, Adrien Hours, Roser Juanola-Parramon, Evangelia Kleisioti, Lorenzo König, Maaïke van Kooten, Mariya Krasteva, Iva Laginja, Rico Landman, Lucie Leboulleux, David Mouillet, Mamadou N’Diaye, Emiel H. Por, Laurent Pueyo, and Frans Snik. Chasing rainbows and ocean glints: Inner working angle constraints for the Habitable Worlds Observatory. MNRAS, 524(4):5477–5485, October 2023.

Co-author:

- [2] N. L. Eisner, O. Barragán, C. Lintott, S. Aigrain, B. Nicholson, T. S. Boyajian, S. Howell, C. Johnston, B. Lakeland, G. Miller, A. McMaster, H. Parviainen, E. J. Safron, M. E. Schwamb, L. Trouille, S. Vaughan, N. Zicher, C. Allen, S. Allen, M. Bouslog, C. Johnson, M. N. Simon, Z. Wolfenbarger, E. M. L. Baeten, D. M. Bundy, and T. Hoffman. Planet Hunters TESS II: findings from the first two years of TESS. *MNRAS*, 501(4):4669–4690, March 2021.