

# Curriculum Vitae of Patrick Barth

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## Contact

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## Work experience

Since 2022       **Visiting Researcher**  
[Space Research Institute, Austrian Academy of Sciences](#), Graz, Austria

Since 2019       **Postgraduate Researcher**  
University of St Andrews, School for Physics and Astronomy & School for Earth and Environmental Sciences, [St Andrews Centre for Exoplanet Science](#), UK

Feb. - July 2017 **Student Research Assistant**  
[Max Planck Institute for Astronomy](#), Heidelberg, Germany

## Education

Since 2019       **PhD in Astronomy**  
University of St Andrews, School for Physics and Astronomy & School for Earth and Environmental Sciences, [St Andrews Centre for Exoplanet Science](#), UK  
Supervisor: Prof. Christiane Helling & Dr. Eva Stüeken

2017 - 2018       **International Student**  
University of Washington, Seattle, United States of America

2017 - 2019       **Master of Science in Physics** (2-year program)  
Final Grade: 1.1 (very good), University of Heidelberg, Department of Physics and Astronomy, Germany

2013 - 2017       **Bachelor of Science in Physics**  
Final grade: 1.7 (good), University of Heidelberg, Department of Physics and Astronomy, Germany

2013              **Abitur**  
Final grade: 1.1 (very good), Karl-Friedrich-Gymnasium Mannheim, Germany

## Awards & Grants

2022	<b>Outstanding Student and PhD candidate Presentation (OSPP) Award</b> EGU General Assembly, 23-27 May 2022, Vienna, Austria
2022	<b>Meeting Attendance Bursary</b> Geochemistry Group (Mineralogical Society of Great Britain and Ireland/Geological Society of London)
2022	<b>Postgraduate Conference Funding Grant</b> School for Earth and Environmental Sciences, University of St Andrews
2021	<b>Student Presentation Award</b> NoRCEL Meeting, 29-31 March 2021, St Andrews, UK (online)
2019 - 2023	<b>St Leonard's Interdisciplinary Doctoral Scholarship</b> University of St Andrews, UK
2017 - 2018	<b>Baden-Württemberg-Stipendium</b> Scholarship for distinguished students studying abroad
2013	High School Graduation Award of the German Physical Society (DPG)

## Students

2020 - 2021	<b>Lukas Rossmann</b> Undergraduate research assistant, spark experiments and analysis, co-supervision with Dr. Eva Stüeken
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## Teaching & Organisation

Since 2021	<b>Organizer of the Physics and Astronomy at St Andrews Inclusion Diversity and Equity Seminar (Panda StrIDES)</b> School of Physics and Astronomy, University of St Andrews, UK
2019 - 2022	<b>Organizer of the <a href="#">Exoplanet Journal Club</a></b> St Andrews Centre for Exoplanet Science
Autumn 2020/2021	<b>Demonstrator for “Astronomy and Astrophysics 1” lab</b> held by Dr. Alexander Scholz, School of Physics and Astronomy, University of St Andrews, UK
Spring 2021	<b>Guest lecture for “Chemistry of the Solar System” lecture</b> held by Dr. Paul Savage and Prof. Christiane Helling, School of Earth and Environmental Sciences, University of St Andrews, UK
Spring 2020/2021	<b>Tutor for “Computational Astrophysics” lecture</b> held by Dr. Peter Woitke, Dr. Christiane Helling, and Dr. Martin Dominik, School of Physics and Astronomy, University of St Andrews, UK

## Publications

- **Barth, P.** et al., 2023, *Isotopic constraints on lightning as a source of fixed nitrogen in Earth’s early biosphere*, Nature Geoscience. DOI (Full text), Research Briefing (Full text), arXiv.
- Rodgers-Lee, D., et al., incl. **Barth, P.**, 2023, *The energetic particle environment of a GJ 436 b-like planet*, MNRAS 521, 5880. DOI, arXiv.
- Raymond, S. N., et al., incl. **Barth, P.**, 2022, *An upper limit on late accretion and water delivery in the TRAPPIST-1 exoplanet system*, Nature Astronomy 6, 80–88. DOI, arXiv.
- **Barth, P.** et al., 2021, *Magma Ocean Evolution of the TRAPPIST-1 planets*, Astrobiology 21, 11. DOI, arXiv, GitHub.
- **Barth, P.** et al., 2021, *MOVES IV. Modelling the influence of stellar XUV-flux, cosmic rays, and stellar energetic particles on the atmospheric composition of the hot Jupiter HD 189733b*, MNRAS, 502, 6201. DOI, arXiv.
- Woitke, P., et al., incl. **Barth, P.**, 2021, *Coexistence of CH<sub>4</sub>, CO<sub>2</sub> and H<sub>2</sub>O in exoplanet atmospheres*, A&A 646, A43. DOI, arXiv.
- Barnes, R., et al., incl. **Barth, P.**, 2020, *VPlanet: The Virtual Planet Simulator*, PASP, 132, 024502. DOI, arXiv, GitHub.
- Carone, L., Baeyens, R., Mollière, P., **Barth, P.**, et al., 2020, *Equatorial retrograde flow in WASP-43b elicited by deep wind jets?*, MNRAS, 496, 3582. DOI, arXiv.

## Talks

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|-----------------|---|
| 21 October 2022 | <b>“Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”</b><br><a href="#">Graz-Vienna Exoplanet Scientists Meeting</a> , Vienna, Austria  |
| 11 August 2022  | <b>“Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”</b><br><a href="#">NoRCEL Meeting</a> , St Andrews, UK                             |
| 21 July 2022    | <b>“Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”</b><br><a href="#">Leverhulme Centre for Life in the Universe</a> , University of Cambridge, UK |
| 27 May 2022     | <b>“Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”</b><br><a href="#">EGU General Assembly 2022</a> , Vienna, Austria                              |
| 15 March 2022   | <b>“The role of lightning for early life on Earth and exoplanets: connecting experiments and simulations”</b><br><a href="#">Hypatia Colloquium Series</a> , ESO (online)               |
| 5 Feb. 2022     | <b>“The role of lightning for early life on Earth and exoplanets”</b><br>invited talk, St Andrews Interdisciplinary Science Conference, UK  |
| 15 Sept. 2021   | <b>“Tracking the role of lightning-produced nitrate for early life with nitrogen isotopes in spark discharge experiments”</b>   |

- AbGradCon 2021, ELSI, Japan (online)
- 9 July 2021 **“Tracking the role of lightning-produced nitrate for early life with nitrogen isotopes in spark discharge experiments”**
- Goldschmidt 2021, Lyon, France (online)
- 28 May 2021 **“Magma Ocean Evolution of the TRAPPIST-1 planets”**  
invited talk, NASA ‘Quantifying Habitability’ Science Working Group (online)
- 29 April 2021 **“Modelling the influence of high-energy radiation on the atmospheric composition of the hot Jupiter HD 189733b”**  
vEGU21 (online)
- 31 March 2021 **“Understanding the role of lightning in the formation of organic molecules on early Earth”**  
NoRCEL Meeting, St Andrews, UK (online)
- 26 Nov. 2020 **“Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”**  
CHAMELEON kick-off meeting, University of St Andrews, UK (online)
- 17 Nov. 2020 **“What’s the role of lightning in the origin of life”**  
Out Thinkers (LGBT+ STEM Week 2020), University of St Andrews, UK (online)
- 21 Oct. 2020 **“Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”**  
Scottish Exoplanet and Brown Dwarf Meeting, University of Edinburgh, UK (online)
- 24 July 2020 **“MOVES IV: Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”**  
NOVO Nordisk Meeting, Niels Bohr Institute, University of Copenhagen, Denmark (online)
- 23 June 2020 **“MOVES IV: Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”**  
Summer Meeting, St Andrews Centre for Exoplanet Science, UK (online)
- 18 Dec. 2019 **“Magma Ocean Model for Terrestrial (Exo)Planets”**  
invited talk, PSF-Coffee, MPIA, Heidelberg, Germany
- 10 Oct. 2019 **“Magma Ocean Model for Terrestrial (Exo)Planets”**  
VPL Meeting, University of Washington, Seattle, US
- 23 Aug. 2019 **“Magma Ocean Model for Terrestrial (Exo)Planets”**  
Summer Meeting, St Andrews Centre for Exoplanet Science, UK
- 27 March 2019 **“Coupled Atmosphere-Interior Model for Terrestrial Planets - Application to Early Earth”**  
General Meeting SPP 1833 Habitable Earth, DFG, Cologne, Germany
- 30 April 2017 **“Zirkulation mit Wolkenbildung in planetaren Atmosphären”**  
(G)Astro-Seminar, jDPG, Bad Kreuznach, Germany
- 11 Jan. 2017 **“Large-Scale Circulation with Cloud Formation in Planetary Atmospheres”**  
invited talk, PSF-Coffee, MPIA, Heidelberg, Germany

## Posters

- 14 Jan. 2022 **“Tracking the role of lightning for early life with nitrogen isotopes in spark experiments”**  
LGBTQ+ STEMinar, Glasgow, UK (online)
- Sept. 2020 **“X-rays, UV, and co: detrimental or beneficial to the origin of life?”**  
[Royal Astronomical Society Early Career Poster Exhibition 2020](#)
- 26 Aug. 2020 **“X-rays, UV, and co: detrimental or beneficial to the origin of life?”**  
The STEM Village Virtual Symposium 2020
- 27-31 July 2020 **“MOVES IV: Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733 b”**  
[Exoplanet 3](#), Heidelberg, Germany (online)
- 6-8 April 2020 **“MOVES IV: Modelling the influence of stellar XUV-flux and cosmic rays on the atmospheric composition of HD 189733 b”**  
UKEXOM, Birmingham, UK (cancelled due to COVID-19)
- 9-13 March 2020 **“MOVES IV: Modelling the influence of stellar XUV-flux and cosmic rays on the atmospheric composition of HD 189733 b”**  
Cloud Academy II, Les Houches, France (cancelled due to COVID-19)
- 15-20 Sept. 2019 **“Desiccation of the TRAPPIST-1 Planets During Their Magma Ocean Phase”**  
EPSC-DPS Joint Meeting, Geneva, Switzerland (presented by Ludmila Carone)
- 24-28 June 2019 **“Desiccation of the TRAPPIST-1 Planets During Their Magma Ocean Phase”**  
Astrobiology Science Conference, Seattle, WA, USA (presented by Rory Barnes)
- 24-28 June 2019 **“Desiccation of the TRAPPIST-1 Planets During Their Magma Ocean Phase”**  
“Star-planet interaction” workshop, Ringberg, Germany (presented by Ludmila Carone)

## Outreach

- April 2023 **ZIB Zack Mini, Children TV, ORF, Austria**  
Answering a child’s question on the shape of the universe
- 2022 - 2023 **Mobile Pavilion for Steiermark Schau 2023**  
Cooperation between Scientists and Artists to produce content and artwork for an exhibition pavilion presented in Vienna and Styria in 2023
- 2022 - 2023 **“What makes a planet habitable?”**  
Talks to Astronomical Societies throughout the UK (online): Aylesbury Astronomical Society, Astronomical Society of Edinburgh, Mexborough & Swinton Astronomical Society, SIGMA Moray’s Astronomy Club
- 26 June 2022 **“How do we find exoplanets?”**  
Dundee Science Centre, UK
- 17 March 2022 **Global Science Show, STEM Ambassador Edition**  
[Video: A Spark For Life](#)
- Sept. 2021 **A Spark in a Flask** (with Emma Puranen)  
in [Around Distant Suns](#), edited by Emma Puranen, Guardbridge Books, 2021.

Anthology of science fiction short stories in collaboration with researchers at the St Andrews Centre for Exoplanet Science

2020 - 2022

[STEM Ambassador, STEM Learning, UK](#)

2019 - 2022

[Mobile Planetarium](#)

University of St Andrews, School for Physics and Astronomy

## Skills

- Languages: German (native), English (fluent), French (B1), Spanish (B1)
- Programming Languages: Python, C, Fortran, C++
- Microsoft Office, LaTeX
- Drivers license (Type B, Germany)

## Volunteer Experience

	<b>University of St Andrews Liberal Democrats</b>
2020 - 2022	Treasurer
	<b>St Andrews Whisky Society</b>
2021 - 2022	Secretary
2019 - 2021	Ordinary Committee member
	<a href="#">SaintsLGBT+, University of St Andrews Student Association</a>
2019 - 2021	Postgraduate Officer
	<a href="#">Hector-Seminar Alumni Association, Germany</a>
2019 - 2021	Vice President
2015 - 2019	Secretary
2013 - 2019	<b>Election Worker</b> in Mannheim, Germany