

# Curriculum Vitae of Patrick Barth (He/Him)

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## Contact

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## Work experience

Since 09/2023            **Executive Assistant**  
                                 [Stuttgart Center for Simulation Science \(SC SimTech\)](#), Cluster of Excellence EXC  
                                 2075 „Data-Integrated Simulation Science“ (SimTech), University of Stuttgart, Ger-  
                                 many  
                                 Responsible for proposal coordination, structural development, membership admin-  
                                 istration, action plan “Pride in STEM”  
09/2022 - 06/2023    **Visiting Researcher**  
                                 [Space Research Institute, Austrian Academy of Sciences](#), Graz, Austria  
09/2019 - 06/2023    **Postgraduate Researcher**  
                                 University of St Andrews, School of Physics & Astronomy and School of Earth &  
                                 Environmental Sciences, [St Andrews Centre for Exoplanet Science](#), UK  
02 - 07/2017            **Student Research Assistant**  
                                 [Max Planck Institute for Astronomy](#), Heidelberg, Germany

## Education

2019 - 2023            **PhD in Astronomy**  
                                 University of St Andrews, School of Physics & Astronomy and School of Earth &  
                                 Environmental Sciences, [St Andrews Centre for Exoplanet Science](#), UK  
                                 Supervisor: Prof. Christiane Helling & Dr. Eva Stüeken  
2017 - 2018            **International Student**, University of Washington, Seattle, USA  
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 As-  
                                 tronomy, 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 of Earth & 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 Rossmanith</b> Undergraduate research assistant, spark experiments and analysis, co-supervision with Dr. Eva Stüeken
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## Teaching & Organisation

2021 - 2022	<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 & 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 & 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 & Astronomy, University of St Andrews, UK

## Publications

- Carone, L., et al., incl. **Barth, P.**, 2025, *From CO<sub>2</sub>- to H<sub>2</sub>O-dominated atmospheres and back – How mixed outgassing changes the volatile distribution in magma oceans around M dwarf stars*, accepted for publication in A&A, [arXiv](#).
- **Barth, P.** et al., 2024, *The effect of lightning on the atmospheric chemistry of exoplanets and potential biosignatures*, A&A 686, A58. [DOI](#), [arXiv](#).
- **Barth, P.** et al., 2023, *Isotopic constraints on lightning as a source of fixed nitrogen in Earth’s early biosphere*, Nature Geoscience 16, 478–484. [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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|------------------|---|
| 30 November 2023 | <b>“Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”</b><br><a href="#">PCE<sub>3</sub> Seminar</a> , NASA Astrobiology Program (online), <a href="#">Video</a> |
| 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</a> Meeting, St Andrews, UK  |
| 21 July 2022     | <b>“Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”</b><br>invited talk, <a href="#">Leverhulme Centre for Life in the Universe</a> , University of Cambridge, UK           |

27 May 2022	<p><b>“Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”</b></p> <p><a href="#">EGU General Assembly 2022</a>, Vienna, Austria</p>
15 March 2022	<p><b>“The role of lightning for early life on Earth and exoplanets: connecting experiments and simulations”</b></p> <p><a href="#">Hypatia Colloquium Series</a>, ESO (online), <a href="#">Video</a></p>
5 Feb. 2022	<p><b>“The role of lightning for early life on Earth and exoplanets”</b></p> <p>invited talk, St Andrews Interdisciplinary Science Conference, UK</p>
15 Sept. 2021	<p><b>“Tracking the role of lightning-produced nitrate for early life with nitrogen isotopes in spark discharge experiments”</b></p> <p><a href="#">AbGradCon 2021</a>, ELSI, Japan (online)</p>
9 July 2021	<p><b>“Tracking the role of lightning-produced nitrate for early life with nitrogen isotopes in spark discharge experiments”</b></p> <p><a href="#">Goldschmidt 2021</a>, Lyon, France (online)</p>
28 May 2021	<p><b>“Magma Ocean Evolution of the TRAPPIST-1 planets”</b></p> <p>invited talk, NASA ‘Quantifying Habitability’ Science Working Group (online)</p>
29 April 2021	<p><b>“Modelling the influence of high-energy radiation on the atmospheric composition of the hot Jupiter HD 189733b”</b></p> <p><a href="#">vEGU21</a> (online)</p>
31 March 2021	<p><b>“Understanding the role of lightning in the formation of organic molecules on early Earth”</b></p> <p><a href="#">NoRCEL</a> Meeting, St Andrews, UK (online)</p>
26 Nov. 2020	<p><b>“Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”</b></p> <p>CHAMELEON kick-off meeting, University of St Andrews, UK (online)</p>
17 Nov. 2020	<p><b>“What’s the role of lightning in the origin of life”</b></p> <p>Out Thinkers (LGBT+ STEM Week 2020), University of St Andrews, UK (online)</p>
21 Oct. 2020	<p><b>“Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”</b></p> <p>Scottish Exoplanet and Brown Dwarf Meeting, University of Edinburgh, UK (online)</p>
24 July 2020	<p><b>“MOVES IV: Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”</b></p> <p>NOVO Nordisk Meeting, Niels Bohr Institute, University of Copenhagen, Denmark (online)</p>
23 June 2020	<p><b>“MOVES IV: Modelling the influence of high-energy radiation on the atmospheric composition of HD 189733b”</b></p> <p>Summer Meeting, St Andrews Centre for Exoplanet Science, UK (online)</p>
18 Dec. 2019	<p><b>“Magma Ocean Model for Terrestrial (Exo)Planets”</b></p> <p>invited talk, PSF-Coffee, MPIA, Heidelberg, Germany</p>
10 Oct. 2019	<p><b>“Magma Ocean Model for Terrestrial (Exo)Planets”</b></p> <p>VPL Meeting, University of Washington, Seattle, US</p>
23 Aug. 2019	<p><b>“Magma Ocean Model for Terrestrial (Exo)Planets”</b></p> <p>Summer Meeting, St Andrews Centre for Exoplanet Science, UK</p>

- 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

- Nov. 2024 **“Blitze und die Suche nach Leben”**  
Article for the German popular science magazin “Sterne und Weltraum”
- April 2023 **[ZIB Zack Mini](#), Children TV, ORF, Austria**  
Answering a child’s question on the shape of the universe

2022 - 2023	<b>Mobile Pavilion for Steiermark Schau 2023</b> Cooperation between Scientists and Artists to produce content and artwork for an exhibition pavilion presented in Vienna and Styria in 2023
2022 - 2023	<b>“What makes a planet habitable?”</b> 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	<b>“How do we find exoplanets?”</b> Dundee Science Centre, UK
17 March 2022	<b>Global Science Show, STEM Ambassador Edition</b> <a href="#">Video: A Spark For Life</a>
Sept. 2021	<b>A Spark in a Flask</b> (with Emma Puranen) in <a href="#">Around Distant Suns</a> , 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	<b>STEM Ambassador, STEM Learning, UK</b>
2019 - 2022	<b>Mobile Planetarium</b> 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)
- First Aider

## Volunteer Experience

	<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