

Curriculum Vitae of Patrick Barth

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Contact

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Work experience

Since 09/2023 **Project Coordinator**
[Stuttgart Center for Simulation Science \(SC SimTech\)](#), Cluster of Excellence EXC
2075 „Data-Integrated Simulation Science“ (SimTech), University of Stuttgart, Ger-
many

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 for Physics and Astronomy & School for Earth
and 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 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 As-
tronomy, Germany

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

Awards & Grants

2022 **Outstanding Student and PhD candidate Presentation (OSPP) Award**
 EGU General Assembly, 23-27 May 2022, Vienna, Austria

2022 **Meeting Attendance Bursary**
 Geochemistry Group (Mineralogical Society of Great Britain and Ireland/Geological Society of London)

2022 **Postgraduate Conference Funding Grant**
 School for Earth and Environmental Sciences, University of St Andrews

2021 **Student Presentation Award**
 NoRCEL Meeting, 29-31 March 2021, St Andrews, UK (online)

2019 - 2023 **St Leonard’s Interdisciplinary Doctoral Scholarship**
 University of St Andrews, UK

2017 - 2018 **Baden-Württemberg-Stipendium**
 Scholarship for distinguished students studying abroad

2013 High School Graduation Award of the German Physical Society (DPG)

Students

2020 - 2021 **Lukas Rossmanith**
 Undergraduate research assistant, spark experiments and analysis, co-supervision with Dr. Eva Stüeken

Teaching & Organisation

2021 - 2022 **Organizer of the Physics and Astronomy at St Andrews Inclusion Diversity and Equity Seminar (Panda StrIDES)**
 School of Physics and Astronomy, University of St Andrews, UK

2019 - 2022 **Organizer of the [Exoplanet Journal Club](#)**
 St Andrews Centre for Exoplanet Science

Autumn
 2020/2021 **Demonstrator for “Astronomy and Astrophysics 1” lab**
 held by Dr. Alexander Scholz, School of Physics and Astronomy, University of St Andrews, UK

Spring 2021 **Guest lecture for “Chemistry of the Solar System” lecture**
 held by Dr. Paul Savage and Prof. Christiane Helling, School of Earth and Environmental Sciences, University of St Andrews, UK

Spring 2020/2021 **Tutor for “Computational Astrophysics” lecture**
 held by Dr. Peter Voitke, 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 CH₄, CO₂ and H₂O 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 | “Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”
PCE₃ Seminar , NASA Astrobiology Program (online), Video |
| 21 October 2022 | “Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”
Graz-Vienna Exoplanet Scientists Meeting , Vienna, Austria |
| 11 August 2022 | “Follow the Nitrogen – Using isotopes to trace nitrogen fixation by lightning on the early Earth”
NoRCEL Meeting, St Andrews, UK |
| 21 July 2022 | “Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”
Leverhulme Centre for Life in the Universe , University of Cambridge, UK |
| 27 May 2022 | “Nitrogen fixation by lightning and its role for early life on Earth and exoplanets”
EGU General Assembly 2022 , Vienna, Austria |
| 15 March 2022 | “The role of lightning for early life on Earth and exoplanets: connecting experiments and simulations”
Hypatia Colloquium Series , ESO (online), Video |
| 5 Feb. 2022 | “The role of lightning for early life on Earth and exoplanets” |

- invited talk, St Andrews Interdisciplinary Science Conference, UK
- 15 Sept. 2021 **“Tracking the role of lightning-produced nitrate for early life with nitrogen isotopes in spark discharge experiments”**
[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

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