Eva-Maria **Ahrer**

Junior Research Group Leader ✉ ahrer@mpia.de

Employment History

Jun 2025 – present	**Junior Group Leader** Max Planck Institute for Astronomy (MPIA) · Heidelberg, Germany Max-Planck-Gesellschaft (MPG) Minerva Fast Track Fellowship
Jul 2024 – Dec 2025	**Postdoctoral Researcher** Max Planck Institute for Astronomy (MPIA) · Heidelberg, Germany DLR (German Space Agency) grant, PI: Ahrer
Sep 2023 – Jun 2024	**Postdoctoral Researcher** Max Planck Institute for Astronomy (MPIA) · Heidelberg, Germany Advisors: Dr Thomas Mikal-Evans and Prof Laura Kreidberg
Jul 2023 – Aug 2023	**Postdoctoral Researcher** University of Exeter · Exeter, UK Advisors: Prof Nathan Mayne

Education

Oct 2019 – Aug 2023	**Doctor of Philosophy in Physics** University of Warwick · Coventry, UK Supervisor: Prof Peter Wheatley
Oct 2018 – Sep 2019	**Master of Philosophy in Physics** University of Cambridge · Cambridge, UK Supervisors: Prof Didier Queloz & Dr Vinesh Maguire-Rajpaul
Oct 2015 – May 2018	**Bachelor of Science in Physics** University of Vienna · Vienna, Austria Thesis supervisors: Prof Eberhard Widmann & Dr Martin Simon, *Stefan Meyer Institute*

Grants & Awards

- DLR (German Space Agency) grant for conducting my independent JWST research programme for 18 months (**EUR** ∼**135,000**; from July 2024 – December 2025)
- **SEM Faculty Thesis Prize 2023**, best PhD thesis within the Faculty of Science, Engineering and Medicine (SEM) at the University of Warwick in the Year 2023 (GBP 500)
- Warwick Astronomy Knowledge Exchange Program (WAKE) to conduct a research visit at Johns Hopkins University Applied Physics Laboratory (GBP 3,000; June 2022)
- RAS PhD travel grant (GBP 860; May 2022)

Awarded observing time

JWST Guest Observer (GO) Programs

- **as PI:** Testing the C/O Ratio Prediction for Hot Jupiters from Disk-Free Migration (**11 hours**, GO 3154)
- **as Co-PI with J. Kirk:** Does atmospheric composition actually trace formation? Observing aligned vs misaligned hot Jupiters as a testbed (**49 hours**, GO 3838)
- as Co-I: The Warm Jupiter Opportunity for Understanding Giant Exoplanet Evolution (60 hours, GO 9025)
- as Co-I: Resolving Atmospheric Uncertainties and Building a Legacy Dataset for WASP-39b (19 hours, GO 8017)
- as Co-I: Warm Jupiters: the next step in uncovering giant planet formation and migration (74 hours, GO 7982)
- as Co-I: KRONOS: Keys to Revealing the Origin and Nature Of sub-neptune Systems (130 hours, GO 5959)
- as Co-I: Starspots, Hazes, and Disequilibrium Chemistry: A Deep Dive into the Atmosphere of HAT-P-18b (16 hours, GO 5844)

- as Co-I: Continuing the Legacy of AU Mic: Simultaneous FUV and NIR Observations of AU Mic b (51 hours, GO 5311)
- as Co-I: Chemistry and Clouds of a Temperate Jupiter (13 hours, GO 4227)
- as Co-I: Putting it all Together: Dynamics and Chemistry Probed Through Transmission Spectroscopy of a Cloud-Free Exoplanet (7 hours, GO 4082)
- as Co-I: Hot Jupiter Atmospheric Forecast: are mornings cloudier than evenings in other worlds? (62 hours, GO 3969)

HST Guest Observer (GO) Programs

- as Co-I: Continuing the Legacy of AU Mic: Simultaneous FUV and NIR Observations of AU Mic b (24 orbits, GO 17613)

ESO Time Awarded

- **as PI:** The LRG-BEASTS Survey: Transmission Spectroscopy of Gaseous Exoplanets, a total of **37 nights** since 2021 with NTT/EFOSC2
- **as PI:** Transmission spectroscopy of hot gaseous exoplanets targeted by JWST, two proposals with **24 nights** in total, with NTT/EFOSC2
- as Co-I: Investigating the role of atmospheric metallicity in inflating the lowest-density hot Jupiter WASP-193b (7h, VLT/CRIRES+)
- as Co-I: LTT 9779b: the only planet in the Neptune desert with a gaseous envelope? (3 nights, NTT/EFOSC2)
- as Co-I: Transmission spectroscopy of the lowest density hot Jupiter (3 nights, NTT/EFOSC2)

List of Publications

(as of 22nd September 2025, for up-to-date list see *NASA ADS Library*)

- 8 first-author publications with 216 citations combined
- >2,000 citations combined, h-index of 19

As first-author

1. **E. Ahrer** et al. 2025c, MNRAS, in press: "BOWIE-ALIGN: weak spectral features in KELT-7b's JWST NIRSpec/G395H transmission spectrum imply a high cloud deck or a low-metallicity atmosphere"
2. **E. Ahrer** et al. 2025b, MNRAS, 540, 2535: "Tracing the formation and migration history: molecular signatures in the atmosphere of misaligned hot Jupiter WASP-94Ab using JWST NIRSpec/G395H"
3. **E. Ahrer** et al. 2025a, ApJL, 985, L10: "Escaping helium and a highly muted spectrum suggest a metal-enriched atmosphere on sub-Neptune GJ3090b from JWST transit spectroscopy"
4. **E. Ahrer** et al. 2024, MNRAS, 530, 2749: "Atmospheric characterization and tighter constraints on the orbital misalignment of WASP-94 A b with HARPS"
5. **E. Ahrer** et al. 2023b, MNRAS, 521, 5636: "LRG-BEASTS: Evidence for clouds in the transmission spectrum of HATS-46 b"
6. **E. Ahrer** et al. 2023a, Nature, 614, 653: "Early Release Science of the exoplanet WASP-39b with JWST NIRCam"
7. **E. Ahrer** et al. 2022, MNRAS, 510, 4857: "LRG-BEASTS: Sodium absorption and Rayleigh scattering in the atmosphere of WASP-94A b using NTT/EFOSC2"
8. **E. Ahrer** et al. 2021, MNRAS, 503, 1248: "The HARPS search for southern extra-solar planets - XLV. Two Neptune mass planets orbiting HD 13808: a study of stellar activity modelling's impact on planet detection"

As co-author

1. I. J. M. Crossfield, **E. Ahrer**, et al. 2025, under review at AAS journals, "Mapping the SO2 Shoreline in Gas Giant Exoplanets"
2. A. Feinstein, et al. incl **E. Ahrer** 2025, submitted to AAS journals, "On Linking Planet Formation Models, Protoplanetary Disk Properties, and Mature Gas Giant Exoplanet Atmospheres"
3. B. Benneke, et al. incl **E. Ahrer** 2025, under review at ApJL, "JWST Reveals CH_4, CO_2, and H_2O in a Metal-rich Miscible Atmosphere on a Two-Earth-Radius Exoplanet"
4. S. Schmidt, et al. incl. **E. Ahrer**, 2025, AJ, in press, "A Comprehensive Reanalysis of K2-18 b's JWST NIRISS+NIRSpec Transmission Spectrum"
5. V. Bourrier, et al. incl **E. Ahrer** 2025, A&A, 701, A190, "ATREIDES: I. Embarking on a trek across the exo-Neptunian landscape with the TOI-421 system"
6. L.-P. Coulombe, et al. incl **E. Ahrer** 2025, AJ, 170, 226, "Possible Evidence for the Presence of Volatiles on the Warm Super-Earth TOI-270 b"
7. C. Cadieux, et al. incl. **E. Ahrer**, 2025, AJ, 170, 154, "Detailed Architecture of the L 98-59 System and Confirmation of a Fifth Planet in the Habitable Zone"
8. R. Luque, et al. incl. **E. Ahrer**, 2025, AJ, 170, 49, "A dark, bare rock for TOI-1685 b from a JWST NIRSpec G395H phase curve"

9. A. Meech, A. B. Claringbold, **E. Ahrer**, et al. 2025, MNRAS, 539, 1381, "BOWIE-ALIGN: Sub-stellar metallicity and carbon depletion in the aligned TrES-4b with JWST NIRSpec transmission spectroscopy"
10. J. Kirk, **E. Ahrer**, et al. 2025, MNRAS, 537, 3027, "BOWIE-ALIGN: a transmission spectrum of the misaligned hot Jupiter WASP-15b"
11. C. Gapp, et al. incl **E. Ahrer** 2025, AJ, 169, 341, "WASP-121 b's transmission spectrum observed with JWST/NIRSpec G395H reveals thermal dissociation and SiO in the atmosphere"
12. T. Evans-Soma, et al. incl **E. Ahrer** 2025, Nature Astronomy, in press "SiO and a super-stellar C/O ratio in the atmosphere of the giant exoplanet WASP-121 b"
13. J. Kirk, **E. Ahrer**, et al. 2024, RASTI, 3, 691, "BOWIE-ALIGN: A JWST comparative survey of aligned vs misaligned hot Jupiters to test the dependence of atmospheric composition on migration history"
14. A. B. T. Penzlin & R. Booth, J. Kirk, J. Owen, **E. Ahrer** et al. 2024, MNRAS, 535, 171, "BOWIE-ALIGN: How formation and migration histories of giant planets impact atmospheric compositions"
15. C. Piaulet, et al. incl **E. Ahrer** 2024, ApJL, 974, L10, "JWST/NIRISS reveals the water-rich "steam world" atmosphere of GJ 9827 d"
16. N. Espinoza, et al. incl **E. Ahrer** 2024, Nature, 632, 1017, "Inhomogeneous terminators on the exoplanet WASP-39 b"
17. A. Carter & E. M. May, N. Espinoza, L. Welbanks, **E. Ahrer**, et al. 2024, Nature Astronomy, 8, 1008, "A Benchmark JWST Near-Infrared Spectrum for the Exoplanet WASP-39b"
18. T. J. Bell, et al. incl **E. Ahrer** 2024, Nature Astronomy, in press, "Nightside clouds and disequilibrium chemistry on the hot Jupiter WASP-43b"
19. M. Zamyatina, et al. incl **E. Ahrer** 2024, MNRAS, 529, 1776, "Quenching-driven equatorial depletion and limb asymmetries in hot Jupiter atmospheres: WASP-96b example"
20. D. Powell, et al. incl **E. Ahrer** 2024, Nature, 626, 979: "Sulfur dioxide in the mid-infrared transmission spectrum of WASP-39b"
21. C. McGruder, et al. incl **E. Ahrer** 2023, AJ, 166, 120: "ACCESS, LRG-BEASTS, and MOPSS: Featureless Optical Transmission Spectra of WASP-25b and WASP-124b"
22. L.-P. Coulombe, et al. incl **E. Ahrer** 2023, Nature, 620, 292: "A broadband thermal emission spectrum of the ultra-hot Jupiter WASP-18b"
23. J. Taylor, et al. incl **E. Ahrer** 2023, MNRAS, 524, 817: "Awesome SOSS: Atmospheric characterisation of WASP-96 b using the JWST early release observations"
24. D. Grant, et al. incl **E. Ahrer** 2023, ApJL, 949, L15: "Detection of Carbon Monoxide's 4.6 Micron Fundamental Band Structure in WASP-39b's Atmosphere with JWST NIRSpec G395H"
25. J. L. Bean, et al. incl **E. Ahrer** 2023, Nature, 618, 43: "High atmospheric metal enrichment for a Saturn-mass planet"
26. S. Tsai, et al. incl **E. Ahrer** 2023, Nature, 617, 483: "Direct Evidence of Photochemistry in an Exoplanet Atmosphere"
27. A. Feinstein, et al. incl **E. Ahrer** 2023, Nature, 614, 670: "Early Release Science of the exoplanet WASP-39b with JWST NIRISS"
28. L. Alderson, et al. incl **E. Ahrer** 2023, Nature, 614, 664: "Early Release Science of the exoplanet WASP-39b with JWST NIRSpec G395H"
29. Z. Rustamkulov, et al. incl **E. Ahrer** 2023, Nature, 614, 659: "Early Release Science of the exoplanet WASP-39b with JWST NIRSpec PRISM"
30. The JWST Transiting Exoplanet Community Early Release Science Team, **E. Ahrer** et al. 2023, Nature, 614, 649: "Identification of carbon dioxide in an exoplanet atmosphere"
31. T. J. Bell, **E. Ahrer** et al. 2022, JOSS, 7, 79, 4503: "Eureka!: An End-to-End Pipeline for JWST Time-Series Observations"
32. N. Unger et al. incl **E. Ahrer** 2021, A&A, 654, A104: "The HARPS search for southern extra-solar planets. XLVI: 12 super-Earths around the solar type stars HD39194, HD93385, HD96700, HD154088, and HD189567"

Teaching & Supervision

Students advised

- Cinta Vidante, **PhD student**, Max Planck Institute for Astronomy, Jun 2025 – present
- Patrick Staudt, **Masters student**, Max Planck Institute for Astronomy, Oct 2023 – Oct 2024
  as a full-time research assistant Nov 2024 – present
- Melanie Bayer, part-time student research assistant, Max Planck Institute for Astronomy Nov 2024 – present
- Djemma Ruseva (co-supervision), summer intern, Max Planck Institute for Astronomy, May 2024 – Aug 2024

Other teaching experience

- **Tutor at NEON Observing School**, Calar Alto Observatory, Spain, February 2025 (2 weeks)
- **Leader and Organiser at the International Astronomical Youth Camp (IAYC);**
  leading 8-9 participants through projects for 3 weeks in 2017, 2018, 2023, and its virtual replacement in 2020 and 2021
- **Laboratory Demonstrator**, 2nd Year Undergraduate Labs, University of Warwick, 2019 – 2022, with a nomination for the **Warwick Awards for Teaching Excellence**

Selected Talks

Seminars & Colloquia

- University of Cambridge, Exoplanet Seminar, Feb 2025
- University of Leeds, Astrophysics Research Group, Apr 2024
- University of Leicester, Astrophysics Group, Mar 2024
- Königstuhl Colloquium, MPIA, Nov 2023
- Seminar at the UK Science and Technology Facilities Council (STFC) Strategy Team Meeting, Jun 2023
- University of Birmingham, Exoplanet Group Meeting, Jun 2023
- ESO Santiago, 30 minutes talk, Feb 2023
- University of Oxford, Early-Career Researcher Astrophysics Seminar, Jan 2023
- University of Exeter, Astrophysics Group, Jan 2023
- Observatoire de Genève, Exoplanets Seminar, Apr 2022
- Centre for Astrophysics (CfA) | Harvard & Smithsonian, Lunch Seminar, Mar 2021

Conference Talks

- The Fate of Neptunian Worlds: exploring demographics, atmospheres and evolution, **invited** review talk, Sep 2025
- Exoclimes VII, contributed talk, Jul 2025
- EAS Session: New Frontiers in Characterising Gas-Giant Exoplanets and Brown Dwarfs, **invited** review talk, Jun 2025
- EAS Session: The chemistry of planet formation, **invited** review talk, Jun 2025
- Challenge Accepted: Linking Planet Formation with Present-Day Atmospheres, contributed talk, Jul 2024
- UK Exoplanet Community Meeting, keynote talk, Apr 2024
- Celebrating JWST's first six months of exoplanet data, Ringberg, contributed talk, Nov 2022
- UK Exoplanet Community Meeting, highlighted talk, Sep 2022
- ESO: Atmospheres, Atmospheres! Do I look like I care about atmospheres?, contributed talk, Aug 2021
- UK Exoplanet Community Meeting, contributed talk, Apr 2021

Academic Service

Referee service

- Nature Astronomy, Astronomy & Astrophysics (A&A), Journal of Open Source Software (JOSS), The Astrophysical Journal Letters (ApJL), Monthly Notices of the Royal Astronomical Society (MNRAS)

Conference Organising Committees

- Co-Chair of Organising Committee, "Signal in the Noise: The Ringberg Workshop on JWST Exoplanet Observations", MPIA / Schloss Ringberg, 2025
- Local Organising Committee (LOC) Member, Challenge Accepted: Linking Planet Formation with Present-Day Atmospheres, MPIA, 2024
- Chair of the session "Exoplanet Atmospheres in the 2020s and beyond" at the National Astronomy Meeting (NAM), University of Warwick, 2022
- Local Organising Committee (LOC) Member, National Astronomy Meeting (NAM), University of Warwick, 2022

Other Committee Work

- Steering Committee Member for the BOWIE collaboration since September 2024
- Executive Committee Member for the STARGATE collaboration since July 2024

Outreach and ED&I service

Service work

- Equality Committee member, Max Planck Institute for Astronomy, since Jan 2024
- Equitea seminar series committee member, University of Warwick, from Nov 2020 – Jan 2023
- Wellbeing and Peer Support Representative for the Physics Postgraduate students at the University of Warwick

Outreach work: International Workshop for Astronomy (IAYC)

- Board member, treasurer of the international organisation behind the IAYC, the International Workshop for Astronomy, overseeing budgets and all monetary decisions, from 2021 – 2025
- As a member we represent and grow an over 50-year-old organisation, e.g. we present at outreach community conferences and publish our efforts:
  "Redefining Astronomy Summer Camps in the Age of the Pandemic: a Break from the IAYC's 50-Year History" by **E. Ahrer**, M. Archipley, H. S. Dalgleish, D. Mortimer, CAP Proceedings 2021
  "Reaching Diverse Groups in Long-Term Astronomy Public Engagement Efforts" by M. Archipley, H. Dalgleish, **E. Ahrer**, D. Mortimer, ASP2020
- Leader and Organiser at the IAYC (see Teaching & Supervision)

Selected public engagements

- Invited Speaker at "Pint of Science" Heidelberg, Jun 2025
- Invited Speaker at "Astro & Co", online discussion about biosignatures on K2-18b, Haus der Astronomie, Apr 2025
- Invited Speaker at teacher training, Haus der Astronomie, Heidelberg, 1h lecture on current challenges in exoplanet science, Nov 2024
- Invited Speaker at teacher training, Marburg, 1h lecture on JWST and what it can do for exoplanet atmospheres, Feb 2024
- Public talk at the Open Day of the Max Planck Institute for Astronomy, Oct 2023
- Invited Speaker at SETI Live, press work for the JWST Early Release Science Transiting Exoplanet Community Team, Dec 2022
- Invited Speaker at "Faszination Astronomie Online", press work for the JWST Early Release Science Transiting Exoplanet Community Team, Dec 2022
- Panel member for the in-person and online event about the first scientific observations with JWST organised by the Royal Astronomical Society (RAS)