

Kaustubh Hakim

SCIENTIFIC RESEARCHER / RESEARCH EXPERT

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Employment

- 02.2023 – present **Research Expert (staff member, 0.5 FTE)**, University of Leuven (KU Leuven), Leuven, Belgium
02.2023 – present **Scientific Researcher (work leader, 0.5 FTE)**, Royal Observatory of Belgium, Brussels, Belgium
02.2019 – 01.2023 **Postdoctoral Researcher**, University of Bern, Bern, Switzerland
09.2014 – 12.2018 **PhD Candidate**, University of Amsterdam, Amsterdam, Netherlands
07.2014 – 08.2014 **Summer Researcher**, Nicolaus Copernicus Astronomical Center, Warsaw, Poland
07.2010 – 08.2012 **Analyst**, Nomura Investment Bank, Mumbai, India
05.2009 – 07.2009 **Intern**, IBM, Bangalore, India

Career Break

- 02.2024 – 03.2024 **Paternity Leave**, Belgium

Education

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| University of Amsterdam / VU Amsterdam | <i>Amsterdam, Netherlands</i> |
| PHD, ASTROPHYSICS & GEOCHEMISTRY (AWARDED ON 18.12.2018) | 12.2018 |
| KU Leuven | <i>Leuven, Belgium</i> |
| MSc, ASTRONOMY & ASTROPHYSICS | 07.2014 |
| Indian Institute of Technology Kharagpur | <i>Kharagpur, India</i> |
| BTECH, ELECTRONICS ENGINEERING | 07.2010 |

Awards & Distinctions

- 2023 **BELSPPO FED-tWIN Research Program, Belgium**, Career Award
2021 **NCCR PlanetS, Switzerland**, Research Project Grant
2021 **Swiss Society of Astronomy & Astrophysics**, Travel Award
2020 **University of Bern**, Young Academics Support Award
2014 **KU Leuven**, MSc with *magna cum laude*
2010 **IIT Kharagpur**, BTech with Honours
2006 **Engineering Entrance Examination, India**, 99.97 %tile among 0.5 million candidates

Publications

- Hakim, K.**, Bower, D.J., Seidler, F., Sossi, P.A. (2025). Silane–Methane Competition in Sub-Neptune Atmospheres as a Diagnostic of Metallicity and Magma Oceans. [arXiv]
- Konings, T., Heinke, L., Baeyens, R., **Hakim, K.**, Christiaens, V., Decin, L. (2025). Reliability of 1D radiative-convective photochemical-equilibrium retrievals on transit spectra of WASP-107b *Astronomy & Astrophysics* [journal] [arXiv]
- Bower, D.J., Thompson, M.A., **Hakim, K.**, Tian, M., Sossi, P.A. (2025). Interior Controls on the Habitability of Rocky Planets. *The Astrophysical Journal* [arXiv]
- Höning, D., Carone, L., Baumeister, P., Chubb, K.L., Grenfell, J.L., **Hakim, K.**, Iro, N., Taysum, B., Tosi, N. (2025). The effect of a biosphere on the habitable timespan of stagnant-lid planets and implications for the atmospheric spectrum.

Astronomy & Astrophysics 693, A205 [journal] [arXiv]

Hakim, K. (2024). Positive Weathering Feedback Compensates Carbonates at Shallow Ocean Depths, IAU Symposium, Vol. 382 (2024) pp. 123–125 [journal]

Gillmann, C., **Hakim, K.**, Lourenco, D., Quanz, S., Sossi, P. (2024). Interior Controls on the Habitability of Rocky Planets. *Space: Science & Technology* 4, 0075 [journal] [arXiv]

Narang, M., Oza, A. V., **Hakim, K.**, Puravankara, M., Tyagi., H., Banerjee, B., Surya, A., Nayak. P.K., Banyal, R.K., Thorngren, D.P. (2023), uGMRT observations of the hot-Saturn WASP 69b: Radio-Loud Exoplanet-Exomoon Survey II (RLEES II), *Monthly Notices of the Royal Astronomical Society* 522, 2 [journal] [arXiv]

Konrad, B.S., Alei, E., Quanz, S.P., Mollière, P., Angerhausen, D., Fortney, J.J., **Hakim, K.**, Jordan, S., Kitzmann, D., Rugheimer, S., Shorttle, O., Wordsworth, R., and the LIFE Collaboration (2023), Large Interferometer For Exoplanets (LIFE): IX. Assessing the impact of clouds on atmospheric retrievals at mid-infrared wavelengths with a Venus-twin exoplanet, *Astronomy & Astrophysics* [journal] [arXiv]

Hakim, K., Tian, M., Bower, D.J., Heng, K. (2023), Diverse Carbonates in Exoplanet Oceans Promote the Carbon Cycle, *Astrophysical Journal Letters* 942, L20 [journal] [arXiv]

Narang, M., Oza, A. V., **Hakim, K.**, Puravankara, M., Banyal, R., Thorngren, D. (2023), Radio-Loud Exoplanet-Exomoon Survey (RLEES): GMRT Search for Cyclotron Maser Emission, *Astronomical Journal* 165, 1 [journal] [arXiv]

Bower, D. J., **Hakim, K.**, Sossi, P. A., Sanan, P. (2022), Retention of water in terrestrial magma oceans and carbon-rich early atmospheres, *Planetary Science Journal* 3, 93 [journal] [arXiv]

Hakim, K., Bower, D. J., Tian, M., Deitrick, R., Auclair-Desrotour, P., Kitzmann, D., Dorn, C., Mezger, K., Heng, K. (2021), Lithologic Controls on Silicate Weathering Regimes of Temperate Planets, *Planetary Science Journal* 2, 49 [journal] [arXiv]

Hakim, K., van den Berg, A., Vazan, A., Höning, D., van Westrenen, W., Dominik, C. (2019), Thermal evolution of rocky exoplanets with a graphite outer shell, *Astronomy & Astrophysics* 630, A152 [journal] [arXiv]

Hakim, K., Spaargaren, R., Grewal D.S., Rohrbach A., Brendt J., Dominik, C., van Westrenen, W. (2019), Mineralogy, structure and habitability of carbon-enriched rocky exoplanets: A laboratory approach, *Astrobiology* 19, 7 [journal] [arXiv]

Hakim, K., van Westrenen, W., Dominik, C. (2018), Capturing the oxidation of silicon carbide in rocky exoplanetary interiors, *Astronomy & Astrophysics* 618, L6 [journal] [arXiv]

Hakim, K., Rivoldini, A., Van Hoolst, T., Cottenier, S., Jaeken, J., Chust, T., Steinle-Neumann, G. (2018), A new ab initio equation of state of hcp-Fe and its application to the interior structure and mass-radius relation of rocky super-Earths, *Icarus* 313, 61–78 [journal] [arXiv]

Selected Presentations

Hakim, K. (2025, contributed talk), The Need for a Multi-Disciplinary Approach for Unravelling the Chemistry of Sub-Neptunes, *Smashing It Workshop, Leeds, United Kingdom*

Hakim, K. (2024, invited talk), Exoplanet Ocean Chemistry Under Carbonate-Silicate Cycling, *Venus Workshop, Austrian Academy of Sciences, Graz, Austria*

Hakim, K. (2024, contributed talk), Magma-Atmosphere Coupling of Hot Sub-Neptunes, *Ariel Consortium Meeting, Lisbon, Portugal*

Hakim, K. (2024, contributed talk), Magma-Atmosphere Coupling of Sub-Neptune Exoplanets, *Geologica Belgica Luxembourgia Meeting, Liege, Belgium*

Hakim, K. (2024, invited seminar), Magma-Atmosphere Coupling in Hot Sub-Neptunes, *Institute for Particle Physics and Astrophysics, ETH Zurich, Switzerland*

Hakim, K. (2024, contributed talk), Impact of Magma-Atmosphere Coupling on Sub-Neptune Populations, *COST Action PLANETS Kick-Off, Torun, Poland*

Hakim, K. (2024, contributed poster), Sub-Neptune populations from magma-atmosphere coupling, *Exoplanets-5 Conference 2024, Leiden, Netherlands*

Hakim, K. (2024, invited talk), The Need for Ab Initio and Laboratory Simulations in Exoplanet Science, *Netherlands Astronomers' Conference 2024, Egmond aan Zee, Netherlands*

Hakim, K. (2024, invited lecture), Chemical Diversity in Rocky Exoplanets & Sub-Neptunes from Laboratory and Ab Initio Simulations 2024 ATSOA Summer Training School, ARIES, Nainital, India

Hakim, K. (2024, invited seminar), Chemical Diversity in Rocky Interiors and Interior-Atmosphere Interactions, *Exoplanet Seminar Series*, NASA Goddard Space Flight Center, USA (virtual)

Hakim, K. (2023, invited lecture), Chemistry of Rocky Worlds and Sub-Neptunes, *ATOMIUM Meeting*, KU Leuven, Belgium

Hakim, K. (2023, invited review talk), Astronomical Windows into Planetary Interiors and Evolution, *Strange New Worlds Exoplanet Conference*, IISER Pune, India

Hakim, K. (2023, invited talk), Impact of Refractory Carbon on Rocky Exoplanet Mineralogy, Evolution & Habitability, *VLT/MATISSE Science Team Meeting* (virtual)

Hakim, K. (2022, invited talk), Chemically-Diverse Exoplanet Interiors and Interior-Atmosphere Interactions, *NOVA NW2 Meeting*, Groningen, Netherlands (virtual)

Hakim, K. (2022, invited talk), Carbon and Sulfur in Exoplanetary Interiors, *HP4 Workshop*, Brussels, Belgium

Hakim, K. (2022, invited review talk), Exoplanetary Interiors and Evolution, *PFE-SPP1992 joint meeting*, Berlin, Germany

Hakim, K. (2022, invited seminar), Chemistry of Planetary Interiors and Surfaces, *National Institute of Science Education and Research*, Bhubaneswar, India

Hakim, K. (2020, plenary talk), Geochemistry of Carbon Cycles on Rocky Exoplanets, *Exoplanets III Conference* (virtual)

Hakim, K. (2020, invited seminar), Application of Geosciences to Exoplanets, *Tata Institute of Fundamental Research*, Mumbai, India

Hakim, K. (2019, poster), Geochemistry of Carbon Cycles on Rocky Exoplanets, *Extreme Solar Systems 4*, Reykjavik, Iceland

Hakim, K., van den Berg, A., Vazan, A., Höning, D., van Westrenen, W., Dominik, C. **(2019, contributed talk)**, Thermal evolution of rocky exoplanets covered with graphite, *Division of Planetary Sciences – Europlanet Science Congress*, Geneva, Switzerland

Hakim, K. (2017, seminar), A laboratory approach to probe the mineralogy of carbon-enriched rocky exoplanets, *University of Chicago*, USA

Hakim, K., van Westrenen, W., Dominik, C. **(2017, contributed talk)**, Mineralogy of Carbon-Enriched Rocky Extra-Solar Planets from Laboratory Experiments, *Lunar and Planetary Science Conference*, Houston, Texas

Hakim, K., Rivoldini, A., Van Hoolst, T., Cottenier, S., Chust, T., Steinle-Neumann, G. **(2017, contributed talk)**, A New Ab Initio Equation of State of hcp-Iron and Its Application to the Interior Structure of Rocky Super-Earths, *Lunar and Planetary Science Conference*, Houston, Texas

Teaching Experience

2024 – present **Physics and Chemistry of Planets**, Co-Lecturer, MSc Astro. & Astrophys., KU Leuven

2020 – 2021 **Radiative Transfer**, Teaching Assistant / Co-Lecturer, MSc Physics, University of Bern

2018 **Planetary Science**, Co-Lecturer, MSc Earth Sciences, VU Amsterdam

2015 – 2017 **Interstellar Medium**, Teaching Assistant, MSc Astro. & Astrophys., University of Amsterdam

Supervision Experience

2024 – 2025 **Darshan Gove**, MSc Thesis, KU Leuven (Supervisor)

2024 – present **Soetkin Willemyns**, PhD Thesis, KU Leuven (Co-Supervisor)

2023 – present **Nuno Pereira**, PhD Thesis, KU Leuven (Co-Supervisor)

2023 – 2024 **Ine Malfait**, MSc Thesis, KU Leuven (Supervisor)

2021 – 2022 **Lukas Carmichael**, MSc Thesis, ETH Zürich (Co-Supervisor)

2018 **Dieke Bentjees**, BSc Thesis, VU Amsterdam (Co-Supervisor)

2016 **Rob Spaargaren**, BSc Thesis, VU Amsterdam (Co-Supervisor)

Service, Leadership and Professional Development

REVIEWING SERVICE FOR FUNDING AGENCIES

NASA ROSES

Université Paris Cité

Swiss National Science Foundation,

REVIEWING SERVICE FOR HIGH-IMPACT JOURNALS

Astrobiology

Journal of Geophysical Research

Astronomy & Astrophysics

Monthly Notices of Royal Astronomical Society

Planetary Science Journal

Geochimica et Cosmochimica Acta

Open Research Europe

Applied Geochemistry

Frontiers in Earth Science

Nature

Reviews of Modern Physics

LEADERSHIP ROLES

- 2025 **Scientific Organising Committee (SOC)**, Belgian-Indian Network of Astronomy Meeting, Calicut, India
- 2023 **Session Convener**, Goldschmidt Conference, Lyon, France
- 2022 **Working Group Coordinator**, NCCR PlanetS Phase 3
- 2022 – 2023 **Session Convener**, European Geosciences Union General Assembly, Vienna, Austria
- 2019 – 2022 **Working Group Organiser**, Atmosphere-Interior Exchange, University of Bern
- 2016 – 2017 **PhD Representative**, PhD-PostDoc Council, University of Amsterdam, Netherlands
- 2015 – 2017 **Meeting Organiser**, Interdisciplinary PEPSci Network, Netherlands
- 2012 – 2014 **Student Representative**, Permanent Education Committee, KU Leuven

SELECTED OUTREACH AND EDUCATION

- 2024 **Co-Lecturer**, Starquakes and Exoplanets in the Milky Way, Junior College STEM Course, KU Leuven
- 2023 **Podcast Guest**, Dark Matter Podcast on YouTube, Friends of Europe, Brussels
- 2021 **Outreach Contribution**, Planets in the Solar System, Astronomy Calendar
- 2019 **Public Science Talk**, Cooking Tiny Planets in the Lab, Astronomy on Tap Bern
- 2019 **Blog Writing**, The Role of Geosciences in Exoplanet Science, European Geosciences Union Blogs
- 2018 **Magazine Contribution**, A New Ultra-High-Pressure Equation Of State For Iron, Science Trends
- 2016 **Student Engagement Talk**, Carbon-rich exoplanets, Universidad de los Andes, Bogotá, Colombia
- 2015 **Volunteer**, Public Stargazing Nights, University of Amsterdam

PROFESSIONAL MEMBERSHIPS

- 2018 – present **Member**, International Astronomical Union
- 2019 – present **Member**, European Geosciences Union
- 2020 – present **Member**, European Association of Geochemistry