

# Kaustubh Hakim

## SENIOR RESEARCHER

KU Leuven, Institute of Astronomy, Celestijnenlaan 200D, 3001 Leuven, Belgium  
Royal Observatory of Belgium, Ringlaan 3, 1180 Brussels Belgium

✉ kaustubh.hakim@kuleuven.be | 🌐 http://exokaustubh.com | 📧 kaustubhhakim | 🐦 @exokaustubh

## Employment

02.2023 – present **Senior Researcher**, University of Leuven (KU Leuven) and Royal Observatory of 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  
07.2010 – 08.2012 **Intern**, IBM, Bangalore, India

## Education

### University of Amsterdam

PHD, ASTROPHYSICS & GEOCHEMISTRY (AWARDED ON 18.12.2018)

Amsterdam, Netherlands

12.2018

### KU Leuven

MSc, ASTRONOMY & ASTROPHYSICS

Leuven, Belgium

07.2014

### Indian Institute of Technology Kharagpur

BTECH, ELECTRONICS ENGINEERING

Kharagpur, India

07.2010

## Awards & Distinctions

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

### PEER-REVIEWED

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* [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., 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]

## THESES

- Hakim, K. (2018)**, Diving Deep Into Rocky Exoplanets, *University of Amsterdam, Netherlands*
- Hakim, K. (2014)**, The Interior Structure of Super-Earths, *KU Leuven, Belgium*
- Hakim, K. (2010)**, Performance Evaluation of s-MAC protocol for Wireless Sensor Networks, *IIT, Kharagpur, India*

## Selected Presentations

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- Hakim, K. (2022, keynote talk)**, Chemically-Diverse Exoplanet Interiors and Interior-Atmosphere Interactions, *NOVA NW2 Meeting, Groningen, Netherlands*
- 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 colloquium)**, Chemistry of Planetary Interiors and Surfaces, *National Institute of Science Education and Research, Bhubaneswar, India*
- Hakim, K.**, Bower, D. J., Tian, M., Deitrick, R., Auclair-Desrotour, P., Kitzmann, D., Dorn, C., Mezger, K., Heng, K. (2021, talk), A Lithology-based Silicate Weathering Model for Earth-like Planets, *European Geosciences Union General Assembly (virtual)*
- Hakim, K.**, Tian, M., Auclair-Desrotour, P., Deitrick, R., Bower, D. J., Kitzmann, D., Dorn, C., Mezger, K., Heng, K. (2020, talk), A Weathering Framework to Model the Inorganic Carbon Cycle on Rocky Exoplanets, *American Astronomical Society Meeting (virtual)*
- Hakim, K. (2020, plenary talk)**, Geochemistry of Carbon Cycles on Rocky Exoplanets III, *Exoplanets Conference (virtual)*
- Hakim, K. (2020, 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, talk), Thermal evolution of rocky exoplanets covered with graphite, *Division of Planetary Sciences – Europlanet Science Congress, Geneva, Switzerland*
- Rivoldini, A., **Hakim, K.**, Van Hoolst, T., Cottenier, S., Jaeken, J., Chust, T., Steinle-Neumann, G. (2017, poster), A New Ab Initio Equation of State of hcp-Fe and Its Implication on the Interior Structure and Mass-Radius Relations of Rocky Super-Earths, *American Geophysical Union Fall Meeting, New Orleans, USA*
- 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, 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, 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

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- 2020 – 2021 **Radiative Transfer**, Teaching Assistant / Co-Lecturer, *MSc Physics*
- 2018 **Planetary Science**, Co-Lecturer, *MSc Earth Sciences*
- 2015 – 2017 **Interstellar Medium**, Teaching Assistant, *MSc Astronomy & Astrophysics*

## Supervision Experience

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- 2021 – present **Lukas Carmichael**, MSc Thesis, ETH Zürich (Co-Advisor)
- 2020 – present **Mark Oosterloo**, PhD Thesis, University of Amsterdam (External Advisor)
- 2018 **Dieke Bentjees**, BSc Thesis, Vrije Universiteit Amsterdam (Co-Advisor)
- 2016 **Rob Spaargaren**, BSc Thesis, Vrije Universiteit Amsterdam (Co-Advisor)

## Granted Telescope Time

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- Hakim, K.**, Oza, A. V. et al. **(2021)**, Radio-Loud Exoplanet-Exomoon Survey (RLEES): A Search for Tidally-Enhanced ECMI, *Giant Metrewave Radio Telescope, India*
- Borsato, N., ..., **Hakim, K.** et al. **(2021)**, A reducing, hydrogen-dominated secondary atmosphere on a warm Earth-sized exoplanet? Constraining geochemistry with CRILES, *European Southern Observatory, Chile*
- Hoeijmakers, J., ..., **Hakim, K.** et al. **(2021)**, Searching for an atmosphere of 55 Cnc e and measuring the inclination of 55 Cnc b from L-band emission with CRILES+, *European Southern Observatory, Chile*
- Oza, A. V., **Hakim, K.** et al. **(2020)**, Novel Method to Detect Active Exomoons : Moon-Induced Cyclotron Emission, *Giant Metrewave Radio Telescope, India*
- Hakim, K.**, Janssens, M. **(2013)**, To confirm three exoplanet candidates of different radii in the Kepler field of view and to determine their masses, *Mercator Telescope, La Palma, Spain*

## Service, Leadership and Professional Development

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### PEER REVIEW FOR HIGH-IMPACT JOURNALS

Journal of Geophysical Research  
 Astronomy & Astrophysics  
 Monthly Notices of Royal Astronomical Society  
 Planetary Science Journal  
 Geochimica et Cosmochimica Acta

### LEADERSHIP ROLES

- 2022 – 2026 **Working Group Co-Animator**, NCCR PlanetS Phase 3
- 04.2022 **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

### DEVELOPMENT COURSES

- Lessons in leadership**, University of Bern, How to keep your team motivated
- Project Management for Researchers**, NCCR PlanetS, How to drive collaborative projects successfully
- Public Speaking for Scientists**, University of Bern, Effectively connect your scientific content with the audience

### SCIENCE COMMUNICATION

- Outreach Contribution**, Planets in the Solar System, Astronomy Calendar (2021)
- Public Science Talk**, Cooking Tiny Planets in the Lab, Astronomy on Tap, Bern, Switzerland (2019)
- Blog Writing**, The Role of Geosciences in Exoplanet Science, European Geosciences Union Blogs (2019)
- Magazine Contribution**, A New Ultra-High-Pressure Equation Of State For Iron Gives Insight Into Super-Earth Interiors, Science Trends (2018)
- Student Engagement Talk**, Carbon-rich exoplanets, Universidad de los Andes, Bogotá, Colombia (2016)
- Volunteer**, Public Stargazing Nights, University of Amsterdam (2015–2017)

### PROFESSIONAL MEMBERSHIPS

International Astronomical Union  
 European Geosciences Union  
 European Association of Geochemistry