

# Dr. Tim Hallatt

THEORETICAL ASTROPHYSICIST

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## Academic Positions

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### Massachusetts Institute of Technology (MIT); MIT Kavli Institute for Astrophysics and Space Research

Cambridge, Massachusetts

POSTDOCTORAL ASSOCIATE

Sept. 2024 - present

- advisor: Dr. Sarah Millholland

## Education

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### McGill University

Montréal, Quebec

PHD, PHYSICS

Sept. 2021 - July, 2024

- advisor: Dr. Eve J. Lee
- thesis title: “On the Formation of Planets in the Milky Way’s Thick Disk”
- topic: theoretical planet formation
- tools: **MESA** hydrodynamics/interior structure code, **REBOUND** dynamics code, **Python**, **Fortran**
- additional skills: machine learning with **scikit-learn**

### McGill University

Montréal, Quebec

MSc, PHYSICS

Sept. 2019 - Sept. 2021

- advisor: Dr. Eve J. Lee
- thesis title: “Leveraging Exoplanet Occurrence Rates to Test Planet Formation Theory”
- topic: theoretical planet formation

### University of Western Ontario

London, Ontario

HON. BSc, PHYSICS

Sept. 2015 - April, 2019

- honours thesis advisor: Dr. Paul Wiegert
- thesis title: “The Dynamics of Interstellar Asteroids and Comets Within the Galaxy”
- topic: dynamics

## Publications

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### PUBLISHED

**Hallatt, T.**, Lee, E. J., 2022. Sculpting the sub-Saturn Occurrence Rate via Atmospheric Mass Loss. *Astrophysical Journal*, vol. 924, no. 9. ([link to paper](#))

**Hallatt, T.**, Lee, E. J., 2020. Can Large-Scale Migration Explain the Giant Planet Occurrence Rate? *Astrophysical Journal*, vol. 904, no. 2. ([link to paper](#))

**Hallatt, T.**, Wiegert, P., 2020. The Dynamics of Interstellar Asteroids and Comets within the Galaxy: an Assessment of Local Candidate Source Regions for 1I/’Oumuamua and 2I/Borisov. *Astronomical Journal*, vol. 159, no. 4. ([link to paper](#))

Cadieux, C., Plotnikov, M., Doyon, R., et al. (incl. **Hallatt, T.**), 2023. New Mass and Radius Constraints on the LHS 1140 Planets – LHS 1140 b is Either a Temperate Mini-Neptune or a Water World (accepted by *Astrophysical Journal Letters*; [link to paper](#)).

### SUBMITTED

**Hallatt, T.**, Lee, E. J., 2024. On the Formation of Planets in the Milky Way’s Thick Disk. Submitted to *ApJ* ([link to paper](#)).

## WHITE PAPERS

Benneke, B., Cowan, N., Rowe, J. et al. (incl. **Hallatt, T.**), 2019. Exoplanet instrumentation in the 2020s: Canada's pathway towards searching for life on potentially Earth-like exoplanets. Canadian Long Range Plan for Astronomy and Astrophysics White Papers, LRP2020. Online at <https://www.zenodo.org/communities/lrp2020>, id.65. ([link to paper](#))

## Seminars & Presentations

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October 2024. *On the Formation of Planets in the Milky Way's Thick Disk*. Planet & Star Formation Coffee, Max Planck Institute for Astronomy, Heidelberg, Germany. (**Invited**; online)

June 2024. *On the Formation of Planets in the Milky Way's Thick Disk*. Poster presentation at Exoplanets 5 conference, Leiden, Netherlands.

September 2023. *Constraining Planet Formation Theory via Exoplanet Occurrence Rates*. Stars & Planets Seminar, Yale University, USA. (**Invited**)

July 2023. *On the Formation of Planets in the Milky Way's Thick Disk*. Oral presentation. Towards Other Earths III: the Planet-Star Connection, Instituto de Astrofísica e Ciências do Espaço, Porto, Portugal

June 2023. *On the Formation of Planets in the Milky Way's Thick Disk*. Oral presentation. Emerging Researchers in Exoplanet Science, Yale University, USA.

May 2021. *Sculpting the sub-Saturn Occurrence Rate via Atmospheric Mass Loss*. Oral presentation. High Energy Exoplanets, European Space Agency XMM-Newton Workshop, Online.

November 2020. *Can Large-Scale Migration Explain the Giant Planet Occurrence Rate?*. Oral presentation. ExoDem Conference, Caltech, Online.

October 2020. *Can Large-Scale Migration Explain the Giant Planet Occurrence Rate?*. Oral presentation. Exocoffee, Max Planck Institute for Astronomy, Online.

August 2020. *The Dynamics of Interstellar Asteroids and Comets Within the Galaxy*. Oral presentation. Division of Dynamical Astronomers Meeting, Online. [Link to presentation](#)

June 2020. *The Dynamics of Interstellar Asteroids and Comets Within the Galaxy*. Poster presentation. American Astronomical Society meeting, Online.

## Select Awards & Fellowships

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2021	<b>Alexander Graham Bell Canada Graduate Scholarship-Doctoral</b> , NSERC	\$ 105,000
2021	<b>Perseverance Scholarship</b> , McGill University	\$ 1200
2021	<b>L. Trottier Science Accelerator fellowship</b> , McGill University	\$ 5000
2020	<b>Alexander Graham Bell Canada Graduate Scholarship-Master's</b> , NSERC	\$ 17,500
2020	<b>Technologies for Exoplanetary Science Fellowship</b> , NSERC	\$ 6500
2019	<b>Donald R. Hay Prize (for best thesis)</b> , Physics & Astronomy Dept., University of Western Ontario	\$ 300
2019	<b>Dr. Gérard Hébert Scholarship in Physics (for community service, academic excellence, research potential)</b> , Physics & Astronomy Dept., University of Western Ontario	\$ 1700

## Additional Research Experience

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## University of Tübingen; Institute for Theoretical Astrophysics

Tübingen, Germany

ADVISOR: DR. ROLF KUIPER

May 2018 - Aug. 2018

- radiation-hydrodynamics simulations of HII regions
- tools: **PLUTO** hydrodynamics code, **Makemake** & **Sedna** radiation transport and photoionization solvers

## Media Citations & Interviews

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[Astronomy Magazine: Our Galaxy's Marvelous Rogues and Misfits](#)

[Scientific American: Mystery of Interstellar Visitor 'Oumuamua Gets Trickier](#)

[Nature: How Two Intruders From Interstellar Space are Upending Astronomy](#)

[Populär Astronomi: Interstellar comet Borisov is a well-known stranger](#)

## Service & Outreach

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August, 2023	<b>McGill STEM summer camp</b> , Science Discussion/Q+A Group Leader	McGill University
2023	<b>Trottier Space Institute</b> , arXiv discussion organizer/leader	McGill University
2020-2022	<b>Trottier Space Institute</b> , Meeting With Speaker organizer/leader	McGill University
2021-2022	<b>McGill Graduate Association of Physics Students</b> , VP Academic	McGill University
2021-2022	<b>McGill Graduate Association of Physics Students mentorship program</b> , lead organizer	McGill University
2019-2022	<b>McGill Graduate Association of Physics Students mentorship program</b> , mentor	McGill University
2021-2022	<b>McGill Graduate Association of Physics Students</b> , Meeting with Speaker organizer/leader	McGill University
2019-2022	<b>McGill Hackathon</b> , mentor	McGill University
2022	<b>Vanderbilt Astronomy Club</b> , public lecture., Online	Vanderbilt University
2021	<b>AstroMcGill public lecture. <a href="#">Our Galactic Neighbourhood: Insights From Exoplanets and Interstellar Objects</a></b> , Online	McGill University
2018-2019	<b>Physics and Astronomy Students' Association</b> , President	University of Western Ontario
2016-2019	<b>Physics and Astronomy Students' Association Help Center</b> , lead organizer/tutor	University of Western Ontario

## Mentorship

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summer, 2023	<b>Vincent Savignac</b> , Undergraduate; research mentorship on sub-Neptune core-envelope interaction	McGill University
2020-2021	<b>Didar Seghi</b> , Undergraduate; academic mentorship	McGill University
2019-2020	<b>Griffin Schwartz</b> , Undergraduate; academic mentorship	McGill University
2019-2020	<b>Harper Sewalls</b> , Undergraduate; academic mentorship	McGill University