

Ryan Cloutier, PhD

ABB 318 – College Ct – Hamilton ON Canada L8S 4L8

ryan.cloutier@mcmaster.ca – (437) 258 3281

<https://physics.mcmaster.ca/~cloutier>

Research Interests

Observational exoplanet astronomer focusing on the detection and characterization of the galaxy's most common planets around its most common stars to inform our understanding of how these planets form and evolve.

Employment

Faculty

Assistant Professor 2022-
Department of Physics & Astronomy, McMaster University

Post Graduate

Banting Fellow 2021-22
Center for Astrophysics | Harvard & Smithsonian

Postdoctoral Fellow 2019-21
Center for Astrophysics | Harvard & Smithsonian

Graduate

PhD Candidate 2014-19
Department of Astronomy & Astrophysics (UofT), Centre for Planetary Sciences, and the Institute for Research on Exoplanets

Undergraduate

Undergraduate Researcher 2012-14
Canadian Institute for Theoretical Astrophysics, Dunlap Institute for Astronomy & Astrophysics, Department of Astronomy & Astrophysics (UofT)

Education

PhD in Astronomy & Astrophysics, University of Toronto 2019
Advisors: Kristen Menou and René Doyon
Thesis: Semi-Parametric Methods to Aid in the Detection and Characterization of Distant Worlds Around Small Stars

Honours BSc w/ Distinction in Physics & Astronomy, University of Toronto 2014
Advisor: Ray Jayawardhana
Thesis: A Deep Spitzer Survey of Circumstellar Disks in the Young Double Cluster, η and χ Persei

Publications

First-Author Refereed Publications (16 in total)

Cloutier, R., Charbonneau, D., Deming, D., Bonfils, X., Astudillo-Defru, N. A More Precise Mass for GJ 1214 b and the Frequency of Multi-Planet Systems Around Mid-M Dwarfs, 2021, [AJ, 162, 174](#)

Cloutier, R., Charbonneau, D., Stassun, K.G., et al. TOI-1634 b: an Ultra-Short Period Keystone Planet Sitting Inside the M Dwarf Radius Valley, 2021, [AJ, 162, 79](#)

Cloutier, R., Rodriguez, J., Irwin, J., et al. TOI-1235 b: a Keystone Super-Earth for Testing Radius Valley Emergence Models Around Early M Dwarfs. 2020, [AJ, 160, 22](#)

Cloutier, R., Eastman, J., Rodriguez, J., et al. A Pair of TESS Planets Spanning the Radius Valley Around the Nearby Mid-M Dwarf LTT 3780. 2020, [AJ, 160, 3](#)

Cloutier, R. & Menou, K.. Evolution of the Radius Valley Around Low Mass Stars from Kepler and K2. 2020, [AJ, 159, 211](#)

Cloutier, R., Astudillo-Defru, N., Bonfils, X., et al. Characterization of the L 98-59 multi-planetary system with HARPS: Mass Characterization of a Hot Super-Earth, a Sub-Neptune, and a Mass Upper Limit on the Third Planet. 2019, [A&A, 629A, 111](#)

Cloutier, R. The Independent Discovery of Planet Candidates Around Low Mass Stars and Astrophysical False Positives in the First Two TESS Sectors. 2019, [AJ, 158, 81](#)

Cloutier, R., Astudillo-Defru, N., Doyon, R., et al. Confirmation of the Radial Velocity Super-Earth K2-18c with HARPS and CARMENES. 2019, [A&A, 621A, 49](#)

Cloutier, R., Doyon, R., Bouchy, F., Hébrard, G. Quantifying the Observational Effort Required for the Radial Velocity Characterization of TESS Planets. 2018, [AJ, 156, 82](#)

Cloutier, R., Artigau, É., Delfosse, X., et al. Predictions of Planet Detections with Near-Infrared Radial Velocities in the Up-coming SPIRou Legacy Survey-Planet Search. 2018, [AJ, 155, 93](#)

Cloutier, R., Astudillo-Defru, N., Doyon, R., et al. Characterization of the K2-18 multi-planetary system with HARPS: A Habitable Zone Super-Earth and Discovery of a Second, Warm Super-Earth on a Non-Coplanar Orbit. 2017, [A&A, 608A, 35](#)

Cloutier, R., Doyon, R, Menou, K., et al. On the Radial Velocity Detection of Additional Planets in Transiting, Slowly Rotating M Dwarf Systems: The Case of GJ 1132. 2017, [AJ, 153, 9](#)

Cloutier, R. & Triaud, A.H.M.J. Menou, K. Prospects for Detecting the Rossiter-McLaughlin Effect of Earth-like Planets: The Test Case of TRAPPIST-1b and c. 2016, [MNRAS, 462, 4018](#)

Cloutier, R., Tamayo, D., & Valencia D. Could Jupiter or Saturn have Ejected a Fifth Giant Planet? 2015, [ApJ, 813, 8](#)

Cloutier, R., Currie, T., Rieke G., et al. A Deep Spitzer Study of Circumstellar Disks in the Young Double Cluster, η and χ Persei. 2014, [ApJ, 796, 127](#)

Cloutier, R. & Lin, M.K. Orbital Migration of Giant Planets Induced by Gravitationally unstable Gaps: The Effect of Planet Mass. 2013, [MNRAS, 434, 621](#)

Contributing-Author Refereed Publications (38 in total)

Winters, J., **Cloutier, R.**, Medina, A., et al. A Second Planet Transiting LTT 1445A and a Determination of the Masses of Both Worlds, 2022, [AJ, 163, 168](#)

DiTomaso, V., et al. (including **Cloutier, R.**) Independent Validation of the Temperate Super-Earth HD 79211b using HARPS-N, 2022, [arXiv:2210:12211](#)

Cadieux, C., et al. (including **Cloutier, R.**) TOI-1452 b: SPIRou and TESS reveal a super-Earth in a temperate orbit transiting an M4 dwarf, 2022, [AJ, 164, 96](#)

Lillo-Box, J., et al. (including **Cloutier, R.**) TOI-969: a Late K Dwarf with a Hot Mini-Neptune in the desert and an Eccentric Hot Jupitier, 2022, A&A accepted

El Mufti, M., et al. (including **Cloutier, R.**) TOI-560: Two Transiting Planets Orbiting a K Dwarf Validated with iSHELL, PFS, and HIRES RVs, 2022, [arXiv:2112.13448](#)

Hawthorn, F., et al. (including **Cloutier, R.**) TOI-836: A super-Earth and mini-Neptune transiting a nearby K-dwarf, 2022, [arXiv:2208.07328](#)

Wilson, T., et al. (including **Cloutier, R.**) A Pair of Sub-Neptunes Transiting the Bright K Dwarf TOI-1064 Characterized by CHEOPS, 2022, [MNRAS, 511, 1043](#)

Kaye, L., et al. (including **Cloutier, R.**) Transit Timing Variations in the Three-Planet System TOI-270, 2022, [MNRAS, 510, 5464](#)

Silverstein, M., et al. (including **Cloutier, R.**) The LHS 1678 System: Two Earth-Sized Transiting Planets and an Astrometric Companion Orbiting an M Dwarf Near the Convective Boundary at 20 pc, 2022, [AJ, 163, 151](#)

Martoli, E., et al. (including **Cloutier, R.**) TOI-1759 b: a transiting sub-Neptune around a low mass star characterized with SPIRou and TESS, 2022, [A&A, 660, 86](#)

Barragán, O., et al. (including **Cloutier, R.**) The Young HD 73583 (TOI-560) Planetary System: Two 10 M_⊕ Mini-Neptunes Transiting a 500 Myr-Old, Bright, and Active K Dwarf, 2022, [MNRAS, 514, 1606](#)

Saunders, N., et al. (including **Cloutier, R.**) TESS Giants Transiting Giants I: A Non-inflated Hot Jupiter Orbiting a Massive Subgiant, 2022, [AJ, 163, 53](#)

Boucher, A., et al. (including **Cloutier, R.**) Characterizing Exoplanetary Atmospheres at High Resolution with SPIRou: Detection of Water on HD 189733 b, 2021, [AJ, 162, 233](#)

Teske, J., et al. (including **Cloutier, R.**) The Magellan-TESS Survey I: Survey Description and Mid-Survey Results, 2021, [ApJS, 256, 33](#)

Giacalone, S., et al. (including **Cloutier, R.**) Validation of Thirteen Hot and Potentially Terrestrial TESS Planets, 2022, [AJ, 163, 99](#)

Bluhm, P., et al. (including **Cloutier, R.**) An Ultra-Short Period Transiting Super-Earth Orbiting the M3 Dwarf TOI-1685, 2021, [A&A, 650A, 78](#)

Soto, M.G., et al. (including **Cloutier, R.**) Mass and Density of the Transiting Hot and Rocky Super-Earth LHS 1478 b, 2021, [A&A, 649A, 144](#)

Ment, K., et al. (including **Cloutier, R.**) TOI-540 b: a Planet Smaller than Earth Orbiting a Nearby Rapidly Rotating Low-Mass Star, 2021, [AJ, 161, 23](#)

Osborn, A., et al. (including **Cloutier, R.**) TOI-431/HIP 26013: a super-Earth and a sub-Neptune transiting a bright, early K dwarf, with a third RV planet, 2021, [MNRAS, 507, 2782](#)

Luque, R., et al. (including **Cloutier, R.**) A Planetary System with Two Transiting Mini-Neptunes Near the Radius Valley Transition around the Bright M Dwarf TOI-776, 2021, [A&A, 645A, 41](#)

Klein, B., et al. (including **Cloutier, R.**) Investigating the Young AU Mic System with SPIRou: Large-Scale Stellar Magnetic Field and Close-in Planet Mass, 2021, [MNRAS, 502, 188](#)

Newton, E., et al. (including **Cloutier, R.**) TESS Hunt for Young and Maturing Exoplanets (THYME). IV. Three Small Planets Orbiting a 120 Myr Old Star in the Pisces-Eridanus Stream, 2021, [AJ, 161, 65](#)

Daylan, T., et al. (including **Cloutier, R.**) TESS Discovery of a Super-Earth and Three Sub-Neptunes Hosted by the Bright, Sun-like star HD 108236, 2021, [AJ, 161, 85](#)

Sha, L., et al. (including **Cloutier, R.**) TOI-954 b and EPIC 246193072 b: Short-Period Saturn-Mass Planets that Test Whether Irradiation Leads to Inflation, 2021, [AJ, 161, 82](#)

Dumusque, X., et al. (including **Cloutier, R.**) Three Years of HARPS-N High-Resolution Spectroscopy and Precise Radial Velocity Data for the Sun, 2020, [A&A, 648A, 103](#)

Kemmer, J., et al. (including **Cloutier, R.**) Discovery of a Hot, Transiting, Earth-Sized Planet and a Second Temperate, Non-Transiting Planet Around the M4 Dwarf GJ 3473, 2020, [A&A, 642A, 236](#)

Martoli, E., et al. (including **Cloutier, R.**) Magnetism and Spin-Orbit Alignment in the Young Planetary System AU Mic, 2020, [A&A, 641L, 1](#)

Astudillo-Defru, N., **Cloutier, R.**, Wang, S., et al. A Hot Terrestrial Planet Orbiting the Bright M Dwarf L 168-9 Unveiled by TESS, 2020, [A&A, 636A, 58](#)

Gilbert, E., et al. (including **Cloutier, R.**) The First Habitable Zone Earth-Sized Planet from TESS I: Validation of the TOI-700 System, 2020, [AJ, 160, 116](#)

Rodriguez, J., et al. (including **Cloutier, R.**) The First Habitable Zone Earth-Sized Planet from TESS I: Spitzer Confirms TOI-700 d, 2020, [AJ, 160, 117](#)

Shporer, A., et al. (including **Cloutier, R.**) GJ 1252b: a 1.2 R_{\oplus} Planet Transiting an M Dwarf at 20.4 pc, 2020, [ApJ, 890, 7](#)

Nelson, B., Ford, E., Buchner, J., **Cloutier, R.**, et al. Quantifying the Evidence for a Planet in Radial Velocity Data, 2020, [AJ, 159, 73](#)

Dalba, P., et al. (including **Cloutier, R.**) The TESS-Keck Survey. I. A Warm Sub-Saturn-Mass Planet and a Caution about Stray Light in TESS Cameras, 2020, [AJ, 159, 241](#)

Bonfils, X., Almenara, J.M., **Cloutier, R.**, et al. Radial Velocity Follow-up of GJ 1132 with HARPS: a Precise Mass for Planet 'b' and the Discovery of a Second Planet, 2018, [A&A, 618A, 142](#)

Ment, K., et al. (including **Cloutier, R.**) A Second Planet with an Earth-like Composition Orbiting the Nearby M dwarf LHS 1140, 2018, [AJ, 157, 32](#)

Currie, T., Grady, C., **Cloutier, R.**, et al. The Matryoshka Disk: Keck/NIRC2 Discovery of a Solar System-Scale, Radially Segregated Residual Protoplanetary Disk Around HD 141569A, 2016, [ApJL, 819, 26](#)

Currie, T., **Cloutier, R.**, Brittain, S., et al. Resolving the HD 100546 Protoplanetary System with the Gemini Planet Imager: Evidence for Multiple Forming, Accreting Planets, 2015, [ApJL, 814, 27](#)

Currie, T., Burrows, A., Girard, J., **Cloutier, R.**, et al. Deep Thermal Infrared Imaging of HR 8799 bcde: New Atmospheric Constraints and Limits on a Fifth Planet, 2014, [ApJ, 795, 133](#)

Currie, T., **Cloutier, R.**, Debes, J., Kenyon, S., & Kessler, D. A Deep Keck/NIRC2 Search for Thermal Emission from Planetary Companions Orbiting Fomalhaut, 2013, [ApJL, 777, 6](#)

Manuscripts Under Review

Cherubim, C., **Cloutier, R.**, et al. TOI-1695 b: a Keystone Water World Elucidating Radius Valley Emergence Mechanisms Around Early M Dwarfs, 2022, [AJ submitted](#)

Non-Refereed Publications

Benneke, B., et al. (including **Cloutier, R.**) *Exoplanet Instrumentation in the 2020s: Canada's Pathway Towards Searching for Life on Potentially Earth-like Exoplanets*, 2020, [Canadian Long Range Plan for Astronomy and Astrophysics, LRP2020](#)

Bouchy, F., et al. (including **Cloutier, R.**) *Near-InfraRed Planet Searcher to Join HARPS on the ESO 3.6-metre Telescope*, 2017, [The ESO Messenger, No. 169](#)

Presentations

Invited Talks

Astrophysics Seminar **Université de Montréal**
Understanding the Origins of the Galaxy's Most Common Planets
around its Most Common Stars 2022

Department Colloquium **York University**
Understanding the Origins of the Galaxy's Most Common Planets
around its Most Common Stars 2022

Origins Institute Seminar **Origins Institute, McMaster University**
The Stellar Mass Dependence of the Radius Valley: Insights into Forming
the Rocky/Enveloped Transition 2022

Department Seminar **Queen's University**
Understanding the Origins of the Galaxy's Most Common Planets
around its Most Common Stars 2022

Department Colloquium **McMaster University**
Understanding the Origins of the Galaxy's Most Common Planets
around its Most Common Stars 2022

Astrophysics Seminar **American Museum of Natural History**
GJ 1214 and the Frequency of Multi-Planet Systems around Mid-M Dwarfs 2021

Chalk Talk lecture **Harvard Origins of Life Initiative**
The Stellar Mass Dependence of the Radius Valley: Insights into Forming
the Rocky/Enveloped Transition 2021

Exoplanet Seminar **Cambridge University**
Testing Radius Valley Emergence Models Around M dwarfs with TESS 2020

Department Colloquium **Geneva Observatory**
Reconciling the Planetary Interpretation of the Radial Velocity Super-Earth K2-18c 2019

Center for Exoplanet & Habitable Worlds Seminar **Penn State**
A Semi-Parametric Approach to Stellar Activity and the Search for Terrestrial
Mass Radial Velocity Planets 2019

Review Talks

Exoplanet Demographics **Virtual Conference**
Sculpting the Close-in Planet Population Across the Main Sequence 2020

Conference Talks

CITA Planet Day **University of Toronto**
On the Rocky/Enveloped Transition of Hot Planets around Cool Stars 2022

Exoplanets III Evolution of the Radius Valley from Sun-Like to Low Mass Stars	Virtual Conference 2020
235th AAS Meeting Masses for Planets Transiting M Dwarfs	Honolulu, HI 2020
235th AAS Meeting Semi-Parametric Methods to Aid in the Detection and Characterization of Distant Worlds Around Small Stars	Honolulu, HI 2020
TESS Science Conference I Present and Future Efforts for PRV Characterization of Southern TESS Planets Through the HARPS M Dwarf Program	Boston, MA 2019
Extremely Precise Radial Velocities IV Reconciling the Planetary Interpretation of the Radial Velocity Super-Earth K2-18c	Grindelwald, Switzerland 2019
2nd Rencontres de Vietnam on Exoplanetary Science Discovering the Closest Habitable Worlds: Planet Detection Predictions for the SPIRou Legacy Survey-Planet Search	Quy Nhon, Vietnam 2018
CASCA 2017 Canadians on the Ground Searching for the Closest Habitable Worlds	Edmonton, AB 2017
SPIRou Science Meeting Simulated Searches for Small Radial Velocity Planets Amid Stellar Activity	Nice, France 2016
CASCA 2016 Detecting Potentially Habitable Earth-like Planets Around Cool Stars with SPIRou	Winnipeg, MA 2016
Emerging Researchers in Exoplanet Science II Detecting Potentially Habitable Earth-like Planets Around Cool Stars with SPIRou	Cornell, Uni. 2016
Conference Posters	
CASCA 2021 GJ 1214 b and the Frequency of Multi-Planet Systems Around Mid-M Dwarfs	Virtual Conference 2021
Exoplanets II Predictive Models of the RV Requirement to Measure Transiting Planet Masses or, How Long does it take to Detect 50 Small TESS Planets?	Cambridge, UK 2018
Extremely Precise Radial Velocities III Planet Detection Predictions from Simulations of the SPIRou Legacy Survey-Planet Search	Penn State 2017
Extreme Solar Systems III The Rossiter-McLaughlin Effect of Planets Transiting M dwarfs and its Impact on Planet Detection in Radial Velocity Surveys	Waikoloa, HI 2015
CASCA 2015 Could Jupiter have Ejected a Fifth Giant Planet from the Solar System?	Hamilton, ON 2015
Media Appearances	
Two super-Earths around the red dwarf K2-18 UofT press release , iREx press release , CTV television interview	2017

Astronomers spy a nursery of baby planets Gemini observatory press release	2015
Who kicked a giant planet out of the solar system 4 billions years ago? We're looking at you Jupiter UofT press release	2015

Teaching, Mentoring, & Outreach Experience

Undergraduate Teaching

Head Teaching Assistant

Responsibilities included managing a team of teaching assistants, developing tutorial materials, leading tutorials, guest lecturing, and hosting office hours and exam-prep sessions.

ASTA02: Beyond the Sun and Planets (150 students)	2017
ASTA01: The Sun and Planets (150 students)	2016
AST201: Stars and Galaxies (1500 students)	2016
AST101: The Sun and its Neighbours (1500 students)	2015

Teaching Assistant

Responsibilities included leading tutorial sessions, facilitating in-class discussions, grading assignments, and hosting office hours and exam-prep sessions.

AST251: Life on Other Worlds (250 students)	2018-19
AST221: Stars and Planets (40 students)	2017-18
AST121: The Origin and Evolution of the Universe (200 students)	2018
CSCC01: Introduction to Software Engineering (200 students)	2016
AST201: Stars and Galaxies (1500 students)	2014-15
AST101: The Sun and its Neighbours (1500 students)	2014-15

Student Mentoring

Master's Thesis students Graduate supervisor to two MSc students at McMaster	2022-
PhD Student Project Advised a Harvard PhD student on a first-year project	2021-2022
CfA Research Experience for Undergraduates (REU) Program Advised a Boston University undergraduate	2022-
CfA Research Experience for Undergraduates (REU) Program Advised a University of Michigan undergraduate	2021-
Harvard-MIT Science Research Mentoring Program Advised three high school students from Cambridge Rindge & Latin School	2021-2022
Harvard Astrophysics Undergraduate Senior Thesis Co-advised a Harvard University senior undergraduate	2021-2022

Workshop Instructor

Workshop on Gaussian process regression in python Center for Planetary Sciences	2016
---	------

Introductory statistics workshop for undergraduate STEM students 2015
Department of Astronomy & Astrophysics (UofT)

Astronomy workshop for Ontario elementary/secondary school teachers 2015-16
York University

Pedagogical Training

Mentoring Undergraduates:
A workshop certificate series for scientist-mentors 2020
Harvard University

Institute for Scientist and Engineer Educators:
Professional Development Program 2015
UC Santa Cruz

Teaching Assistant's Training Program 2015
University of Toronto

Public Outreach

Origins Institute Public Lecture 2022
A series of live and virtual public lectures

Octave of Light Concert Series 2021
Public lecture fused with musical accompaniment

Exoplanet Seminar 2021
Latino Initiative Program

Classroom Q&A sessions 2018-21
St. Joachim Elementary School
Christ the King Elementary School

AstroTour Public Lecture Series 2017
University of Toronto

Graduate Speaker Series: Astronomy and Astrophysics 2017
University of Toronto

Mystical Landscapes Planetarium Show 2016
Art Gallery of Ontario

Public Lecture 2015
North York Astronomical Association

Outreach Positions

UofT Planetarium 2015-19
Planetarium operator

Science Unlimited Summer Camp 2017-18
Camp volunteer

UofT AstroTours 2016-18
Executive committee member

Misc. Event Volunteer 2015-19
Public solar/night observing, Science Rendezvous street festival, Astro on Tap, etc.

Approved PI Observing Programs

TESS Large Guest Investigator Program (Cycles 3 & 4) – \$250,000 USD	2020-
Understanding the Physical Origin of the Rocky/Enveloped Transition Around Mid-to-Late M Dwarfs	
TESS Small Guest Investigator Program (Cycle 4) – \$70,000 USD	2021-
Radial Velocity Measurements with HARPS-N to Uncover the Formation Pathway of Keystone Planets Around M Dwarfs	
Gemini-North/MAROON-X – (6.5 hrs)	2023A
The Origin of the Rocky/Enveloped Transition around M dwarfs: the Test Case of TOI-5388 b	
Gemini-South/IGRINS – (12.4 + 12.5 hrs)	2022A
Empirically calibrating the method to measure accurate M dwarf elemental abundances	
Canada France Hawaii Telescope/SPIRou – (10.1 + 11.9 + 3.0 hrs)	2021-
Empirically calibrating the method to measure detailed M dwarf elemental abundances	
Canada France Hawaii Telescope/SPIRou – (0.5 hrs)	2020A
Recovering the Detailed Internal Structure of the Massive Terrestrial Exoplanet TOI-1235 b	
Canada France Hawaii Telescope/SPIRou – (16 + 12.3 hrs)	2019-20
RVxTESS: Photometric and Spectropolarimetric Studies of M Dwarfs with Simultaneous TESS and CFHT/SPIRou Observations	

Awards & Recognitions

Fellowships

NSERC Banting Fellowship	2021-23
Center for Astrophysics Harvard & Smithsonian	
NSERC Postgraduate Scholarship – Doctoral	2016-19
Department of Astronomy & Astrophysics (UofT)	
Ontario Graduate Scholarship	2015-16
Department of Astronomy & Astrophysics (UofT)	
Lachlan Gilchrist Fellowship	2015-19
Department of Astronomy & Astrophysics (UofT)	
Center for Planetary Sciences Graduate Fellowship	2014-16
Centre for Planetary Sciences	
NSERC Canadian Graduate Scholarship – Masters	2014-15
Department of Astronomy & Astrophysics (UofT)	

Academic Recognitions

Allen Yen Award for Excellence in Research	2018
Department of Astronomy & Astrophysics (UofT)	
Mary H. Beatty Scholarship	2014-15
Department of Astronomy & Astrophysics (UofT)	

Professional Service

Professional Positions

Journal Referee 2017-

The Astronomical Journal

Astronomy & Astrophysics

Monthly Notices of the Royal Astronomical Society

Proceedings of the National Academy of Sciences of the United States of America

Telescope TAC Panelist 2020-

Gemini-North and South

Canada France Hawaii Telescope (CFHT)

Funding Agency Review Panelist 2021

NASA Exoplanets Research Program (XRP)

Professional Memberships

Canadian Astronomical Society (CASCA) Member 2015-

American Astronomical Society (AAS) Member 2019-2022