Christopher Mann

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EDUCATION

2018—present **Ph.D.,** Physics (focus: Observational Astronomy – exoplanets)
Université de Montréal (UdeM)

2016—2018 **Master of Science,** Astronomy
University of British Columbia (UBC)

2013—2016 **Bachelor of Science with Distinction,** Astronomy
University of British Columbia

2008—2013 **Bachelor of Arts,** Psychology
University of British Columbia

RESEARCH EXPERIENCE

2024—present **Research Officer (postdoc)**
Herzberg Astronomy and Astrophysics Research Centre (NRC)
Advisor: Dr. Christian Marois
Project: Assessing and developing the image processing routines for the SPIDERS pathfinder instrument. Implementing the Coherent Differential Imaging (CDI) technique to improve imaging contrast and applying pixel-level calibrations. Developing a final processing pipeline that will run at unprecedented cadence for this type of high-contrast imaging.

2018—2023 **Ph.D. Dissertation**
Université de Montréal
Advisor: Dr. David Lafrenière
Project: Developing an observing mode and reduction/analysis pipeline for the Dragonfly Telephoto Array to enable its use as an exoplanet transit detector. Successful proposals/campaigns for photometric follow-up of TESS planetary candidates using Dragonfly, NEOSSat, Gemini, and OMM. Leading of planetary validation and confirmation publications.

2016—2018 **Master's Thesis** (ASTR 549)
University of British Columbia
Advisor: Dr. Harvey Richer
Project: A more encompassing and thorough treatment of the 47-Tucanae intermediate mass black hole question investigated during my undergraduate thesis (see below).

2015—2016 **Undergraduate Thesis** (ASTR 449)
University of British Columbia
Advisor: Dr. Harvey Richer
Project: Proper motion velocity dispersion analysis to determine/constrain the presence of an intermediate-mass black hole in the centre of the globular cluster 47-Tucanae.

2015 **Research Assistant**
University of British Columbia
Advisor: Dr. Harvey Richer
Project: Photometric reduction of Hubble Space Telescope images to identify white dwarf stars that show signs of infrared-excess, indicating the potential presence of a dusty proto-planetary disk. Resulted in successful observing proposals with Gemini South.

2014 **Research Assistant**
University of British Columbia
Advisor: Dr. Aaron Boley
Project: Carried out a suite of hydrodynamics simulations to investigate the plausibility of early solar system planetoid bow shocks being an effective site for chondrule thermal processing.

EDUCATION AND PUBLIC OUTREACH

2022 (May) iREx summer intern welcome lecture (Exoplanets 101).
Level: Undergraduate

2022 (Feb) CanYes virtual classroom visit.
Level: Grade 8

2021 (Jan) Presentation on basics of exoplanet research for a local Naturalists' Club.
Level: General public

2020 (Nov) RASC introductory presentation on exoplanets.
Level: Undergraduate

2020 (Jan) Helped facilitate "Intro to Physics Research" workshop for UdeM students.
Level: Undergraduate

2019 (Oct) Skype a Scientist virtual classroom visit through RASC.
Level: Highschool

2019 (May) Astronomer in Classroom program for local elementary schools.
Level: Grades 3-5

2018 (Dec) Presented on space science for my nephew's classroom.
Level: Grade 2

RESEARCH AND TEACHING INTERESTS

- Exoplanet observation and characterization
- Observational astronomy in general (optical and infrared)

- Instrumentation development and support
- Photometric reduction and analysis
- Stellar and planetary dynamics
- I very much enjoy the teaching aspect of academia in addition to conducting research. I look forward to increasing my experience in an instructional role.
    - *Special note*: My time spent in at the Université de Montréal taught me a great deal, however my lack of French fluency prevented me from engaging in the most interactive teaching duties.

RELEVANT WORK EXPERIENCE

Feb-July 2022 **Scientific writer for website content**
Institute for Research on Exoplanets (iREx)
Produced majority of the exoplanet science content on iREx's new website. Discussed current research at a level appropriate for the general public.

Summer 2012 **Outreach/Tours/Outreach Assistant**
TRIUMF: Canada's particle accelerator centre
Conducted science and facility tours for groups and drop-in visitors. Developed and carried out physics-related EPO events for the surrounding community.

Summer 2011 **Science Facilitator**
Science World
Perform science shows and demonstrations in the exhibit halls to engage and educate guests on a wide range of subjects. Ran educational summer day-camps with >15 children.

FORMAL INSTRUCTION EXPERIENCE

TA Institute – UBC Centre for Teaching, Learning, and Technology

Jan 2018 Attended a 3-day teaching and facilitation workshop. Specific sessions on handling large classes, small-group work, developing a teaching philosophy and portfolio, assessment techniques, and growth mindset teaching.

Teaching Assistant – University of British Columbia

Winter 2018 ASTR 205: Stars and Stellar populations
Developing homework assignments, facilitating tutorial/discuss sessions, holding office hours, marking (~30 students).

Fall 2017 ASTR 101: Introduction to the solar system (science majors)
Facilitated a pilot program focused on inquiry-based learning techniques. Guest-lectured, led weekly laboratories (~20 students) as well as conducted office hours and marking duties for half the class (~50 students).

Summer 2017 ASTR 311: Stars and Galaxies (non-science majors)
Online course. Duties involved expanding course material and resources, marking, office-hours and virtual interaction with students via discussion forums. (~60 students)

Winter 2017 ASTR 311: Stars and Galaxies (non-science majors)
Duties involved running weekly tutorials, marking, holding office hours, and monitoring a discussion forum. (~70 students)

Fall 2016 ASTR 310: Introduction to the solar system (non-science majors)
Duties involved teaching weekly labs, marking, and holding office hours. (~100 students)

PUBLICATIONS (* indicates co-authorship)

Published in refereed journal

* Detection of Atmospheric Escape from Four Young Mini Neptunes
Michael Zhang, Heather A. Knutson, Fei Dai (+6 more)
The Astronomical Journal, 165, 62, 2023

* The TESS-Keck Survey. XI. Mass Measurements for Four Transiting sub-Neptunes orbiting K dwarf TOI-1246
Emma Turtelboom, Lauren M. Weiss, Courtney D. Dressing (+76 more)
The Astronomical Journal, 163, 6, 2022

* The TESS-Keck Survey. VIII. Confirmation of a Transiting Giant Planet on an Eccentric 261 Day Orbit with the Automated Planet Finder Telescope
Paul A. Dalba, Stephen R. Kane, Diana Dragomir (+72 more)
The Astronomical Journal, 163, 61, 2022

A multi-mass velocity dispersion model of 47 Tucanae indicates no evidence for an intermediate mass black hole
Christopher R. Mann, Harvey Richer, Jeremy Heyl, Jay Anderson, Ilaria Caiazzo, Alan Knee, Swantje Möhle, Holger Baumgardt
The Astrophysical Journal, 875, 1, 2019

Planetary Embryo Bow Shocks as a Mechanism for Chondrule Formation
Christopher R. Mann, Aaron C. Boley, and Melissa A. Morris
The Astrophysical Journal, 818, 2, 2016

Completed referee revisions (awaiting final decision)

Validation of TOI-1221 b, a warm sub-Neptune exhibiting TTVs around a Sun-like star
Christopher R. Mann, David Lafrenière, Diana Dragomir (+24 more)
The Astronomical Journal,
(arXiv: https://arxiv.org/abs/2209.13651; under review)

In preparation (Final titles TBD)

Confirmation of exoplanet TOI-2010 b (*to submit Nov 2022*)

Modifications and capabilities of the Dragonfly Telephoto Array (*to submit Dec 2022*)

* Confirmation of exoplanet TOI-1823.01 (*PI: Hanna Kellermann*)

* NEOSSat technical specifications (*PI: Jason Rowe*)

HONOURS & AWARDS

2023—2025	**NSERC Post-Doctoral Fellowship (PDF)**	$90,000
2019—2022	**NSERC Alexander Graham Bell CGS-D** Awarded to top-ranked applicants in PhD programs	$105,000
2019	**Best research poster award, CASCA**	$200
2017—2018	**Catalyst Paper Corporation Fellowship**	$16,000
2015	**NSERC Undergraduate Student Research Award (USRA)**	$4,500
2014	**Science Undergraduate Research (SURE) Award**	$2,500
2010—2011	**Premier Undergraduate Scholarships and Wesbrook Scholars** Must be among top 10% of faculty	--
2009—2011	**Trek Excellence Scholarship** (2 years) Must be in the top 5% of year, faculty, and school	$1,500 x 2
2009—2011	**Membership to Golden Key Society** Must be among top 15% of your university year	--
2008	**UBC President's Entrance Scholarship**	$2,000

CONFERENCES & ACADEMIC MEETINGS

2022 **Centre for Research in Astrophysics of Quebec (CRAQ)**
Annual General Meeting
- Series of topical lectures with a focus on student research
- Presented 10-minute talk on NEOSSat research

2017—2022 **Canadian Astronomical Society – Société Canadienne d'Astronomie (CASCA)**
Annual General Meeting: In-person and virtual
- Virtual presenters, poster competition, and networking
- Placed 1st in poster competition for my work with Dragonfly (2019)
- Gave 15-minute presentation on my preliminary intermediate mass black hole master's research results (2017)

2019 **Mauna Kea Grad School**
Large observatory experience program for graduate students
- Spent one week visiting Mauna Kea observatories and headquarters.
- Gained hands-on proposal writing, observing, and telescope operation experience.

2019 **Centre for Research in Astrophysics of Quebec (CRAQ)**
Annual graduate student summer school
- Series of topical lectures and workshops, themed around Stellar Astrophysics

2017 **Gemini North & Canada-France-Hawaii Telescope (CFHT) headquarters**
Professional meeting: Hilo and Waimea (respectively), Hawaii, USA
- Gave 20-minute presentations on my intermediate mass black hole research (master's) to researchers and staff of both institutions.
- Networked and toured observatory and headquarters facilities.

2015 **American Astronomical Society**
225th Annual Meeting: Seattle, USA
- Presented in a judged poster contest on my work investigating planetary embryo bow shocks as potential thermal processing sites for chondrules.
- Attended several keynote presentations.

TECHNICAL SKILLS

Python, photometric reduction/processing (photutils, AstroDrizzle, DAOPHOT, ds9, custom pipelines), data analysis, model fitting (emcee, nested sampling, batman, Juliet, AllesFitter, radvel), developing and conducting observing proposals

GROUP & ASSOCIATION MEMBERSHIPS

2021—present TESS Single Transiting Planet Candidate (TSTPC) working group
2018—present TESS Exoplanet Follow-up Observing Program (ExoFOP-TESS)
2018—present Institute for Research on Exoplanets (iREx)
2017—present CASCA
2015—2016 American Astronomical Society

REFERENCES:

Name: **Dr. David Lafrenière**
Position: Professor
Relationship: PhD Supervisor
Institution: Université de Montréal
Email: david.lafreniere@umontreal.ca

Name: **Dr. Diana Dragomir**
Position: Professor
Relationship: Head of TESS Single Transit Planet Candidate (TSTPC) working group
Institution: University of New Mexico
Email: dragomir@unm.edu

Name: **Dr. Paul Dalba**
Position: Heising-Simons 51 Pegasi b Postdoctoral Fellow
Relationship: Publication collaborator
Institution: University of California, Santa Cruz
Email: pdalba@ucsc.edu