# Michael Radica | Curriculum Vitae

NSERC Postdoctoral Fellow – University of Chicago
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## General Information

- Nationality: Canadian
- Languages: English (Native), French (Conversational)
- Affiliations: Canadian Astronomical Society (CASCA), Centre de Recherche en Astrophysiqe du Québec (CRAQ), Trottier Institute for Research on Exoplanets (iREx)

## Education

- **Ph.D., Astrophysics** 2024
  Université de Montréal, Montréal, QC, Canada
  Advisor: Dr. David Lafrenière
  *GPA: 4.3/4.3*
  - Dissertation: *Insights into the Diversity of Exoplanet Atmospheres in the Era of JWST*
- **M.Sc., Physics & Astronomy** 2019
  McMaster University, Hamilton, ON, Canada
  Advisor: Dr. Douglas Welch
  *GPA: 11.7/12*
  - Dissertation: *A Search for Light Echoes from Core-Collapse Supernovae in NGC 6946*
- **B.Sc. Summa Cum Laude, Honours Physics Co-op** 2017
  McMaster University, Hamilton, ON, Canada
  Advisor: Dr. Laura Parker
  *GPA: 11.3/12*
  - Dissertation: *On the Segregation of Dark Matter Substructure in the Bolshoi Simulation*

## Fellowships & Research Funding

- NSERC Postdoctoral Fellowship (2yr) **$140,000** 2024
- CSA JWST Cycle 2 Grant (Science PI; Awarded to UdeM) **$87,000** 2023

All values in Canadian Dollars

## Other Awards & Honours

- CASCA Annual General Meeting Best Student Talk 2024
- CASCA Annual General Meeting Travel Support **$750** 2023
- CRAQ International Internship Scholarship **$7,500** 2022
- First Science Results from JWST Conference Travel Support **$500** 2022
- Bourse J.A. DeSève (1yr; *declined*) **$8,000** 2021
- NSERC Canada Graduate Scholarship — Doctoral Program (3yr) **$105,000** 2021
- FRQNT Bourse de Doctorat en Recherche (3yr) **$70,000** 2021
- iREx Trottier Scholarship **$1,000** 2019, 2020, 2021
- Ontario Graduate Scholarship (1yr; *declined*) **$15,000** 2019
- McMaster University Symposium Day; $1^{st}$ Place Talk 2018
- NSERC Canada Graduate Scholarship — Master's Program (1yr) **$17,500** 2018

- Ontario Graduate Scholarship (1yr) **$15,000** 2017
- Ontario Graduate Fellowship (1yr; *declined*) **$12,500** 2017
- Canadian Undergraduate Physics Conference 1$^{st}$ Place Talk 2015, 2016
- McMaster University Faculty of Science Dean's List 2013 – 2017
- McMaster University President's Award **$2,500** 2012

All values in Canadian Dollars

## Refereed Publications

Summary: 6 first author, 750+ citations, hindex=14
Full library of publications available on the ADS.

### First Author Publications

6. **Radica, M.** "exoTEDRF: An EXOplanet Transit and Eclipse Data Reduction Framework". *JOSS*, submitted.
5. **Radica, M.**; et al. "Muted Spectral Features in the JWST NIRISS Transmission Spectrum of Hot-Neptune LTT 9779 b" 2024. *ApJL*, 962, L20.
4. **Radica, M.**; et al. "Awesome SOSS: Transmission Spectroscopy of WASP-96b with NIRISS/SOSS" 2023. *MNRAS*, 524, 1.
3. **Radica, M.**; et al. "Revisiting Radial Velocity Measurements of the K2-18 System with the Line-by-Line Framework" 2022. *MNRAS*, 517, 4.
2. **Radica, M.**; et al. "APPLESOSS: A Producer of ProfiLEs for SOSS. Application to the NIRISS SOSS Mode" 2022. *PASP*, 134, 104502.
1. **Radica, M.**; Welch, D.; Rousseau-Nepton, L. "A Search for Supernova Light Echoes in NGC 6946 with SITELLE" 2020. *MNRAS*, 497, 3.

### Second & Third Author Publications

5. Piaulet-Ghorayeb, C.; Benneke, B.; **Radica, M.**; et al. "NIRISS/SOSS reveals the water-rich 'steam world' atmosphere of GJ 9827 d". *ApJL*, accepted.
4. Coulombe, L.-P.; **Radica, M.**; et al. "Phase-Resolved Reflected-Light and Thermal-Emission Spectroscopy of an Ultra-Hot Exo-Neptune". *Nature Astronomy*, submitted.
3. Fournier-Tondreau, M.; MacDonald, R.; **Radica, M.**; et al. "Near-Infrared Transmission Spectroscopy of HAT-P-18 b with NIRISS: Disentangling Planetary and Stellar Features in the Era of JWST" 2024. *MNRAS*, 528, 2.
2. Taylor, J.; **Radica, M.**; et al. "Awesome SOSS: Atmospheric Characterisation of the Early Release Observations of WASP-96b" 2023. *MNRAS*, 524, 1.
1. Feinstein, A.; **Radica, M.**; et al. "Early Release Science of the exoplanet WASP-39b with JWST NIRISS" 2023. *Nature*, 614, 670–675.

### Co-Author Publications

22. Fisher, C.; et al. (incl. **Radica, M.**) "JWST/NIRISS and HST: Exploring the improved ability to characterise exoplanet atmospheres in the JWST era". *MNRAS*, submitted.
21. Louie, D.; et al. (incl. **Radica, M.**) "JWST-TST DREAMS: A Definitive Water Abundance for WASP-17b from NIRISS SOSS Transmission Spectroscopy". *AJ*, submitted.
20. Benneke, B.; et al. (incl. **Radica, M.**) "JWST Reveals $CH_4$, $CO_2$, and $H_2O$ in a Metal-rich Miscible Atmosphere on a Two-Earth-Radius Exoplanet". *ApJL*, submitted.

Gressier, A.; et al. (incl. **Radica, M.**) "JWST-TST DREAMS: A Super-Solar Metallicity in WASP-17 b's Day-side Atmosphere from NIRISS SOSS Eclipse Spectroscopy". *AJ*, submitted.

19. Carter, A.; May, E.; et al. (incl. **Radica, M.**) "A Benchmark JWST Near-Infrared Spectrum for the Exoplanet WASP-39b" 2024. *Nature Astronomy*, in press.
18. Hammond, M.; et al. (incl. **Radica, M.**) "Identifying and Fitting Eclipse Maps of Exoplanets with Cross-Validation" 2024. *MNRAS*, 532, 4, 4350–4368.
17. TRAPPIST-1 JWST Community Initiative; et al. (incl. **Radica, M.**) "A Roadmap to the Efficient and Robust Characterization of Temperate Terrestrial Planet Atmospheres with JWST" 2024. *Nature Astronomy*, 8, 810–818.
16. Cadieux, C.; et al. (incl. **Radica, M.**) "Transmission Spectroscopy of the Habitable Zone Exoplanet LHS 1140 b with JWST/NIRISS" 2024. *ApJL*, 970, L2.
15. Zamyatina, M.; et al. (incl. **Radica, M.**) "Quenching-Driven Equatorial Depletion and Limb Asymmetries in Hot Jupiter Atmospheres: WASP-96b Example" 2024. *MNRAS*, 528, 2.
14. Powell, D.; et al. (incl. **Radica, M.**) "Sulfur dioxide in the mid-infrared transmission spectrum of WASP-39b" 2024. *Nature*, 626, 979–983.
13. Howard, W.; et al. (incl. **Radica, M.**) "Characterizing the Near-infrared Spectra of Flares from TRAPPIST-1 During JWST Transit Spectroscopy Observations" 2023. *ApJ*, 959, 1.
12. Lim, O.; et al. (incl. **Radica, M.**) "Atmospheric Reconnaissance of TRAPPIST-1 b with JWST/NIRISS: Evidence for Strong Stellar Contamination in the Transmission Spectra" 2023. *ApJL*, 955, 1.
11. Boucher, A.; et al. (incl. **Radica, M.** "CO or no CO? Narrowing the CO Abundance Constraint and Recovering the H2O Detection in the Atmosphere of WASP-127 b Using SPIRou" 2023. *MNRAS*, 522, 4.
10. Coulombe, L.-P.; et al. (incl. **Radica, M.**) "A Broadband Thermal Emission Spectrum of the Ultra-Hot Jupiter WASP-18b" 2023. *Nature*, 620, 292–298.
9. Allart, R.; et al. (incl. **Radica, M.**) "Homogeneous Search for Helium in the Atmosphere of 11 Gas Giant Exoplanets with SPIRou" 2023. *A&A*, 677, A164.
8. Doyon, R.; et al. (incl. **Radica, M.**) "The Near Infrared Imager and Slitless Spectrograph for the James Webb Space Telescope - I Instrument Overview and in-Flight Performance" 2023. *PASP*, 135, 098001.
7. Albert, L.; et al. (incl. **Radica, M.**) "The Near Infrared Imager and Slitless Spectrograph for the James Webb Space Telescope - III. Single Object Slitless Spectroscopy" 2023. *PASP*, 135, 075001.
6. Kammerer, J.; et al. (incl. **Radica, M.**) "The Near Infrared Imager and Slitless Spectrograph for JWST – V. Kernel Phase Imaging and Data Analysis" 2023. *PASP*, 134, 014502.
5. Rustamkulov, Z.; et al. (incl. **Radica, M.**) "Early Release Science of the exoplanet WASP-39b with JWST NIRSpec PRISM" 2023. *Nature*, 614, 659–663.
4. JWST Transiting Exoplanet Community Early Release Science Team, et al. (incl. **Radica, M.**) "Identification of carbon dioxide in an exoplanet atmosphere" 2023. *Nature*, 614, 649–652.
3. Darveau-Bernier, A.; et al. (incl. **Radica, M.**) "ATOCA: an algorithm to treat order contamination. Application to the NIRISS SOSS mode" 2022. *PASP*, 134, 094502.
2. Boucher, A.; et al. (incl. **Radica, M.**) "Characterizing exoplanetary atmospheres at high resolution with SPIRou: Detection of water on HD 189733 b" 2021. *AJ*, 162, 233.
1. Stein, Y.; et al. (incl. **Radica, M.**) "CHANG-ES XXI. Transport Processes and the X-Shaped Magnetic Field of NGC 4217: Off-Center Superbubble Structure" 2020. *A&A*, 639, A111.

## Selected White Papers & Conference Proceedings

2. **Radica, M.**; et al. "Quantifying Biases in Extracted NIRISS/SOSS Spectra" 2022. *Bulletin of the American Astronomical Society*, Vol. 54, No. 5.

1. Benneke, B; et al. (incl. **Radica, M.**) "Exoplanet Instrumentation in the 2020s: Canada's Pathway Towards Searching for Life on Potentially Earth-Like Exoplanets" 2020. *Canadian Long Range Plan 2020*.

## Selected Successful Observing Proposals

Summary: 9 PI programs, 14 Co-I programs.

### Space-Based Observatories

**JWST**

- **2024: PI** | JWST-GO-5744 | 16 hrs
  *Starspots, Hazes, and Disequilibrium Chemistry: A Deep Dive into the Atmosphere of HAT-P-18b*.
- **2024: Co-I** | JWST-GO-5967 | 21 hrs
  *Exploring the desert: Thermal characterization of an exposed planetary core*. PI: P.-A. Roy.
- **2024: Co-I** | JWST-GO-5959 | 145 hrs
  *KRONOS: Keys to Revealing the Origin and Nature of Sub-Neptune Systems*. PI: A. Feinstein.
- **2024: Co-I** | JWST-GO-5268 | 60 hrs
  *Around the World in Less than Two Days: Observing the Spectral Phase Curve of an Ultra-Hot Jupiter with JWST/NIRSpec*. PI: J. Wardenier.
- **2023: Co-I** | JWST-DD-6543 | 16 hrs
  *Stellar Activity Characterization of LHS 1140 - Is LHS 1140 b a Mini-Neptune or a Water World?*. PI: C. Cadieux.
- **2023: PI** | JWST-GO-4082 | 7 hrs
  *Putting it all Together: Dynamics and Chemistry Probed Through Transmission Spectroscopy of a Cloud-Free Exoplanet*.
- **2023: Co-I** | JWST-GO-4098 | 82 hrs
  *Exploring the Existence and Diversity of Volatile-Rich Water Worlds*. PI: B. Benneke.

**HST**

- **2022: PI** | HST-GO-2663 | 12 orbits
  *Unravelling the Mysteries of LTT 9779b — Studying Clouds that Shouldn't Exist on a Planet that Shouldn't Exist*.

### Ground-Based Observatories

**CFHT**

- **2023: PI** | SPIRou-23BC022 | 16 hrs
  *Born Survivor: A SPIRou Study of a Hot-Neptune Orbiting a Red-Giant Star*.
- **2021: PI** | SPIRou-21BC009 | 8 hrs
  *Do Exo-Neptunes Have Low-Metallicity Atmospheres? A Case Study of HAT-P-11b*.
- **2018: PI** | SITELLE-18BC017 | 12 hrs
  *A SITELLE Survey for Highly Broadened H-alpha P-Cygni Profiles in NGC 6946 from Core-Collapse Supernova Light Echoes*.

**Gemini**

- **2023: PI** | MAROON-X-22AC021 | 40 hrs
  *RV Characterization of the Keystone Triple Planet System TOI-1749*.
- **2022: PI** | IGRINS-22AC022 | 5 hrs

*An IGRINS Study of the First Hot-Neptune*.

**VLT**

- **2023: Co-I** | ESPRESSO-112.25T7 | 40 hrs
  *Mirror in the Desert: constraining the high resolution reflection spectrum of the unusual ultra hot Neptune LTT9779 b*. PI: S. Vaughan.

**OMM**

- **2021: PI** | PESTO-21C-07 | 36 hrs
  *Photometric Followup of an M-Dwarf Trio of Planets Spanning the Radius Valley*.

## Talks & Posters

Summary: 10 Talks, 3 Invited, 2 for general public; 9 Seminars; 8 Posters.
Timeline: 2024 (6), 2023 (7), 2022 (3), 2021 (2), 2020 (2), 2019 (1)

### Invited Talks

2. *Awesome SOSS: Transmission Spectroscopy of WASP-96b with NIRISS/SOSS*
   **OMM-NRC Astronomy Day**, Montréal, Canada — Apr 2023
1. *Awesome SOSS: Transmission Spectroscopy of WASP-96b with NIRISS/SOSS*
   **JWST Exoplanet Atmospheres Meeting**, Oxford, UK — Mar 2023

### Invited Colloquia & Seminars

9. Physics & Astronomy Seminar, **Memorial University of Newfoundland** — Aug 2024
8. APEx Seminar, **Max-Planck-Institut für Astronomie** — Mar 2024
7. iREx Seminar, **Université de Montréal** — Jan 2024
6. AOPP Seminar, **University of Oxford** — Apr 2023
5. Astronomy Seminar, **University of Exeter** — Apr 2023
4. Astronomy Seminar, **University of Bristol** — Apr 2023
3. Astronomy Colloquium, **Canada-France-Hawaii Telescope** — Dec 2017
2. Summer Astrophysics Colloquium, **University of Manitoba** — Aug 2016
1. Undergraduate Physics Colloquium, **McMaster University** — Feb 2013

### Contributed Conference Talks & Posters

* Denotes a poster presentation.

14. *A Comprehensive Study of the Only Known Ultra-Hot-Neptune*
    **CASCA Annual General Meeting**, Toronto, Canada — Jun 2024
13. **Ultraviolet to Infrared Atmosphere Spectroscopy of the Hot-Neptune LTT 9779b*
    **Exoplanets V**, Leiden, Netherlands — Jun 2024
12. **Awesome SOSS: Transmission Spectroscopy of WASP-96b with NIRISS/SOSS*
    **ExoClimes VI**, Exeter, UK — Jun 2023
11. *Awesome SOSS: Transmission Spectroscopy of WASP-96b with NIRISS/SOSS*
    **CASCA Annual General Meeting**, Penticton, BC, Canada — Jun 2023
10. *A First Look Transmission Spectrum of WASP-96b with NIRISS/SOSS*
    **First Science Results from JWST**, Baltimore, MD, USA — Dec 2022
9. **A Validation of the Line-by-Line Framework for Precision Velocimetry with the K2-18 System*
    **CASCA Annual General Meeting**, Waterloo, ON, Canada (*virtual*) — May 2022
8. **How Assumptions in the Underlying Spatial Profile Impact Extracted NIRISS/SOSS Spectra*
    **Exoplanets IV**, Las Vegas, NV, USA — May 2022

7. **Towards a Robust Extraction Algorithm for NIRISS SOSS Spectra*
   **CASCA Annual General Meeting**, Penticton, BC, Canada (*virtual*) May 2021
6. **Towards a Robust Extraction Algorithm for NIRISS SOSS Spectra*
   **Exoplanets III**, Heidelberg, Germany (*virtual*) Jul 2020
5. **NEAT Exploration of Exoplanet Atmospheres*
   **CASCA Annual General Meeting**, York, ON, Canada (*virtual*) May 2020
4. **A Search for Supernova Light Echoes in NGC 6946 with SITELLE*
   **CASCA Annual General Meeting**, Montréal, QC, Canada Jun 2019
3. *The Search for Supernova Light Echoes in NGC 6946*
   **McMaster University Symposium Day**, Hamilton, ON, Canada Oct 2018
2. *The Evolution of Dark Matter Substructure in Simulated Galaxy Clusters*
   **Canadian Undergraduate Physics Conference**, Halifax, NS, Canada Nov 2016
1. *Studying Radio Haloes of Galaxies with CHANG-ES*
   **Canadian Undergraduate Physics Conference**, Peterborough, ON, Canada Nov 2014

### Invited Public Talks

2. *From Earth Twins to Water Worlds; the Big Questions About Small Planets*
   LaSalle Community Comprehensive High School, Montréal, QC, Canada May 2024
1. *The Search for Earth 2.0*
   Villa Maria College, Montréal, QC, Canada Oct 2021

## Open-Source Software

Summary: `GitHub`: ☆5 ⑂5 ⬇35 | `Zenodo`: ⬇4

- **`exoUPRF`**: `https://github.com/radicamc/exoUPRF`
  – Library for flexible light curve fitting.
- **`exoTEDRF`**: `https://github.com/radicamc/exoTEDRF`
  – Tools for the end-to-end reduction of JWST time series observations.
- **`APPLESOSS`**: `https://github.com/radicamc/applesoss`
  – Software to create data-driven PSF models for JWST NIRISS/SOSS observations.

## Committee Membership & Community Service

- Reviewer for MNRAS, Science 2023 – present
  – Three manuscripts reviewed.
- Canadian Undergraduate Physics Conference Judge Nov 2021
  – Judge for student talks in astrophysics.
- Canadian Astronomical Society Annual General Meeting Online Organizing Committee 2020 – 2021
- Université de Montréal Equity and Diversity Committee 2020 – 2022
  – Led initiative to invite indigenous speakers from the Montréal area to the first journal club of each year to share their ancestral knowledge of astronomy.
- Canadian Astronomical Society Graduate Student Committee 2020 – 2023
  – Co-led series of monthly town halls during spring/summer of 2020 to provide safe spaces for graduate students to share experiences about adjusting to working during the COVID-19 pandemic.
  – Led initiative to highlight work of indigenous graduate students in weekly social media posts during Canadian National Indigenous History Month (June).

## Media & Press

- *AwesomeSOSS*, CASCA Gradhighlights (Oct 2023) [Link]

- *An exoplanet atmosphere as never seen before*, UdeMnouvelles (Nov 2022) [Link]
- *Exploration de la diversité atmospherique d'exoplanètes en transit*, Moteur de Recherche (Nov 2022) [Link]

## Teaching & Mentorship

- **Co-op Program Alumni Mentor** 2020 – 2023
  McMaster University
  – Mentor to one undergraduate student per year in the Physics & Astronomy co-op program.
- **Teaching Assistant** 2020 – 2022
  Université de Montréal
  – Marking and presentation of tutorials (*en français*) for courses incl. :
  Astrobiologie (Winter 2020 – 2022; 7 hr/wk)
  Introduction à la Physique Numérique (Fall 2020; 10 hr/wk)
- **Graduate Student Mentor** 2018 – 2019
  McMaster University
  – Mentor to incoming M.Sc student.
- **Teaching Assistant** 2017 – 2019
  McMaster University
  – Marking and presentation of tutorials for courses incl. :
  Introduction to Physics for Engineers (Winter 2017; 6 hr/wk)
  Planetary Astronomy (Winter 2018, 2019; 6 hr/wk)
  Introduction to Astronomy (Fall 2018; 6 hr/wk)
  The Big Questions in Astronomy (Fall 2018; 6 hr/wk)
  Stellar Structure (Winter 2019; 6 hr/wk)
- **Senior Undergraduate Mentor** 2016
  University of Manitoba
  – Research mentor to two first year undergraduate students.
- **Physics Tutor** 2014 – 2023
  Private Tutor: Undergraduate/Secondary School Physics (2021 – 2023; 2 hr/wk)
  Private Tutor: Undergraduate Physics (Fall/Winter 2019; 2 hr/wk)
  McMaster Physics Help Center (Winter 2018; 3 hr/wk)
  McMaster Physics Help Initiative (2014 – 2016; 2 hr/wk)

## Other Research Experience

- Visiting Student. Supervisor: Dr. Hannah Wakeford 2023
  University of Bristol, Britstol, UK
  – Performed analysis of HST/UVIS eclipse observations of LTT 9779 b.
- Science Intern. Supervisor: Dr. Laurie Rousseau-Nepton 2017
  Canada-France-Hawaii Telescope, Waimea, HI, USA
  – Studied dust extinction in the Milky Way using the SITELLE instrument.
- Research Assistant. Supervisor: Dr. Chris O'Dea 2016
  University of Manitoba, Winnipeg, MB, Canada
  – Developed tools to quantify the X-ray morphology of AGNs.
- Research Assistant. Supervisor: Dr. Judith Irwin 2015
  Queen's University, Kingston, ON, Canada
  – Analyzed EVLA radio observations of galactic haloes as part of the CHANG-ES survey.

## Other Science Outreach

- LaSalle Community Comprehensive High School (May 2024)
  – Invited presentations about astronomy research in secondary school classrooms.
- 24 Hours of Science — Astronomer in your Classroom (May 2021)

– Astronomy presentations for three primary school classrooms.

- Montréal Student Space Association iREx Liaison (2020 – 2022)
  – Aided in organization of yearly Montréal Space Symposium (∼100 attendees).
- William J. McCallion Planetarium Presenter (2017 – 2019)
  – Weekly presentations to undergraduate classes and the general public.
- McMaster Sidewalk Astronomy (2017 – 2019)
  – Member of McMaster's "Sidewalk Astronomy" initiative.
- McMaster University Fall Preview Lab Tour Guide (Oct 2013)