Nicole M. Ford

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Education

McGill University, Doctor of Philosophy, Physics — 2023 – Present
Advisor: Daryl Haggard

McGill University, Master of Science, Physics — 2021 – 2023
Advisors: Daryl Haggard & John Ruan

Williams College, Bachelor of Arts, Astrophysics & Studio Art — 2016 – 2020
Highest Honors in Astrophysics
Advisor: Anne Jaskot

Experience

Graduate Researcher - High Energy Astrophysics — Aug 2021 – Present
Trottier Space Institute at McGill (TSI)
Advisors: Professor Daryl Haggard & Professor John Ruan

- (PhD) Monitoring X-ray flux and variability of several low luminosity AGNs targeted by the *Event Horizon Telescope* collaboration to learn about their accretion and links to radio/multi-wavelength emission.
- (MSc) Identified ion absorption signatures for different types of kilonovae using simulated spectra and machine learning techniques, and developed kilonova observational follow-up code for use with *CFHT*.

Research Intern - Computational Astrophysics — Aug 2020 – July 2021
Lawrence Berkeley National Laboratory, DOE SULI Program
Advisors: Dr. Ann Almgren, Dr. Donald Willcox, & Dr. Sherwood Richers

- Simulated Type I x-ray bursts and neutrino emission around neutron stars/mergers using adaptive mesh refinement (AMReX, Castro codes) and particle-in-cell (Emu code) techniques.

Undergraduate Thesis Researcher - Galaxy Observations — 2019 – 2020
Williams College, Clare Boothe Luce Scholar Program
Advisor: Professor Anne Jaskot

- Tested indicators for ionizing radiation escape in nearby star forming galaxies using *Hubble* & *SDSS* spectra.

Research Intern - Cosmic Ray Observations — Jan – Jul 2019
CERN and University of Geneva, Boston University Geneva Physics Program
Advisor: Dr. Maura Graziani

- Tracked solar activity via the *Alpha Magnetic Spectrometer*'s measured cosmic ray positron/electron ratio.

Research Assistant - Galaxy Observations — May – Aug 2018
University of Massachusetts, Amherst, Williams College Summer Science Research Fellowship
Advisor: Professor Anne Jaskot

- Searched for ionizing radiation escape in Green Pea galaxies' gas ionization structures using *Hubble* data.

REU Intern - Planet Transit Observations — May – Aug 2017
Wellesley College, Keck Northeast Astronomy Consortium (KNAC) NSF REU program
Advisor: Professor Kim McLeod

- Searched for light curve planet transits, collaboration with the Kilodegree Extremely Little Telescope group.

Honors & Awards

Doctoral Research Award, Fonds de recherche du Québec – Nature et technologies — 2023-2027

McGill Becentennial Art & Science Exhibition "Traditional Media" Prize, McGill University — 2022

McGill Space Institute Fellowship, McGill University — 2021-present

AAS Chambliss Astronomy Achievement Award, Undergraduate Student Prize Winner — 2020

Clare Boothe Luce Scholar, Williams College — 2018

PUBLICATIONS

Refereed Contributions

Ford, N. M., Vieira, N., Ruan, J. J., Haggard, D., KilonovAE: Exploring Kilonova Spectral Features with Autoencoders, *accepted for publication in ApJ* [ads]

Vieira, N., Ruan, J. J., Haggard, D., **Ford, N. M.**, et al., Spectroscopic r-Process Abundance Retrieval for Kilonovae II: Lanthanides in the Inferred Abundance Patterns of Multi-Component Ejecta from the GW170817 Kilonova, *accepted for publication in ApJ* [ads]

Vieira, N., Ruan, J. J., Haggard, D., **Ford, N. M.**, et al., Spectroscopic r-Process Abundance Retrieval for Kilonovae I: The Inferred Abundance Pattern of Early Emission from GW170817, ApJ 944.2 [ads]

Flury, S., et al. (*incl.* **Ford, N. M.**), The Low-Redshift Lyman Continuum Survey II: New Insights into LyC Diagnostics, ApJ 930.2 (2022). [ads]

Flury, S., et al. (*incl.* **Ford, N. M.**), The Low-redshift Lyman Continuum Survey. I. New, Diverse Local Lyman Continuum Emitters, ApJS 260.1 (2022). [ads]

Richers, S., Willcox, D. E., **Ford, N. M.**, and Myers, A., Particle-in-Cell Simulation of the Neutrino Fast Flavor Instability, PRD 104.10 (2021). [ads]

Richers, S., Willcox, D. E., **Ford, N. M.**, and Myers, A., Particle-in-Cell Simulation of the Neutrino Fast Flavor Instability, PRD 103.8 (2021). [ads]

Harpole, A., **Ford, N. M.**, Eiden, K., Zingale, M., Willcox, D. E., Cavecchi, Y., Katz, M. P., Dynamics of Laterally Propagating Flames in X-ray Bursts. II. Realistic Burning & Rotation, ApJ 912.36 (2021). [ads]

Non-Refereed Contributions

Ford, N. M., KilonovAE: Exploring Kilonova Spectral Features with Autoencoders, 2023, *McGill University Masters Thesis*.

Ford, N. M., Optical Properties of Low-Redshift Star-Forming Galaxies with Potential Ionizing Radiation Escape, 2020, *Williams College Honors Thesis*. [online]

CONFERENCE & SEMINAR TALKS

"Exploring Neutron Star Merger Spectral Features with Dimensionality Reduction"
Talk: Centre de Recherche en Astrophysique du Quebéc Summer Meeting, May 2023

"Exploring Neutron Star Merger Spectral Features Using Dimensionality Reduction"
Talk: Bishop's University Invited Talk, March 2023

"Exploring Kilonova Spectra and Nucleosynthesis with Variational Autoencoders"
Talk: American Astronomical Society 237th Meeting, January 2023

"CFHT Gravitational Wave Follow-up Pipeline Development"
Talk: Centre de Recherche en Astrophysique du Quebéc Summer Meeting, May 2022

"Dynamics of Laterally Propagating Flames in X-ray Bursts. II. Realistic Burning & Rotation"
Poster: American Astronomical Society 237th Meeting, January 2021

"Optical Properties of Low-Redshift Star-Forming Galaxies with Potential Ionizing Radiation Escape"
Poster: American Astronomical Society 235th Meeting in Honolulu, HI, January 2020
Poster & Talk: Conference for Undergraduate Women in Physics at Yale, January 2020
Talk: KNAC Fall 2019 Conference at Vassar College, October 2019

"Imaging Green Pea Galaxies"
Poster: KNAC Fall 2018 Conference at Middlebury College, October 2018

"Searching for Exoplanets with Wellesley's 24" Telescope"
Talk: KNAC Fall 2017 Conference at Wesleyan University, October 2017

ACCEPTED TELESCOPE PROPOSALS

James Webb Space Telescope Cycle 2: "Sgr A* as Particle Accelerator: What Drives the Black Hole's Variable IR and X-ray Emission?", 29.88 hr, PI: Joseph Hora (**Co-I: N. M. Ford**)

Gemini North 2023A: "Tick Tock: A Spectroscopic Investigation into an Imminently Merging Supermassive Black Hole Binary Candidate", 7.8 hr, **PI: N. M. Ford**

Computer Time Allocations

Senior Investigator on a NERSC 2021 Allocation, *Neutrino Flavor Transformation in Neutron Star Mergers* (18 M MPP hours)

Co-Investigator on a NERSC 2021 Allocation, *Three-dimensional studies of white dwarfs, massive stars, and neutron star systems* (30 M MPP hours)

Senior Investigator on a BRIDGES/2 2021 Allocation, *Neutrino Flavor Instabilities in Neutron Star Mergers* (4000 GPU hours)

Teaching

Teaching Assistant, McGill University Department of Physics — Aug 2021 – Dec 2021
Supervisor: Prof. Katelin Schutz

Teaching Assistant, Williams College Hopkins Observatory — 2017 – 2020
Supervisors: Dr. Steven Souza & Dr. Kevin Flaherty

Student Research Supervision

Marissa Lindon, McGill University (U3) (co-supervised w/Nicholas Vieira) — Jan 2023 – Aug 2023

Charlotte Garcia, McGill University (U3) (co-supervised w/Nicholas Vieira) — Jan 2023 – Apr 2023

Science Communication

"Black Holes: The Cosmic Vacuum Cleaners", Astronomy On Tap, Montreal, QC — Sept 2023

"Intro to Science Visualization", Trottier Space Institute Lunch Talk, Montreal, QC — Oct 2022

"How To Be an Astrophysicist", McGill Bicentennial Space Week, Montreal, QC — May 2022

Outreach & Inreach

Scientista McGill Mentor, McGill University — Sept 2023 – present

Science in Space Mentor, TSI and Dell Technologies: Girls Who Game — Oct 2022 – present

Observatory Guide, McGill Anna I. MacPherson observatory — Sept 2022 – present

Graduate Seminar Coordinator, TSI — Sept 2022 – present

AstroMcGill Outreach Coordinator, TSI — Jan 2022 – Aug 2022

Physics Hackathon Judge, Department of Physics — Nov 2021, 2022

STEM Mentor, Fab Fem Organization — Mar 2020 – Mar 2021

Women & Gender Minorities in Physics & Astronomy Co-President, Williams College 2016 – 2020

Professional Memberships

Event Horizon Telescope Collaboration — Aug 2023 – present
AGN, Time Domain, and Multi-wavelength Working Groups

CASTOR Time Domain Science Working Group — 2022 – present

Centre de Recherche en Astrophysique du Quebéc — 2021 – present

Canadian Astronomical Society — 2021 – present

American Astronomical Society — 2020 – present