James T. Garland

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Education

University of Toronto — Toronto, ON, Canada
Ph.D. in Astronomy and Astrophysics — *Sep 2023 – Nov 2028 (Expected)*

Haverford College — Haverford, PA, USA
B.Sc. in Physics and Astronomy — *Sep 2018 – May 2022*

- Thesis: *The Interplay of Tides, Bars, and Star Formation in Disk Galaxies*
- Departmental High Honors

Research Experience

American Museum of Natural History — New York City, NY, USA
Research Assistant — *Jul 2022 – Jul 2023*

- Worked with Dr. Michael Shara and the Condor Array Telescope collaboration on identifying extragalactic novae and low-surface-brightness nova remnants in multi-epoch broad- and narrow-band images.
- Developed an automated source detection, photometry, and classification pipeline to identify transients in multi-epoch images and line-emission sources in multi-wavelength images.
- Used image correlation techniques between Condor and archival data to quantify the expansion of the nova shell around Z Cam.
- Planned observations of nova remnants for two SALT DDT proposals and analyzed the resulting RSS longslit spectra.
- Collaborated on an HST Cycle 31 proposal to measure extragalactic nova rates.

Haverford College — Haverford, PA, USA
Undergraduate Research Intern (Multiple Internships) — *Sep 2019 – May 2022*

- Worked in the research groups of Professors Karen Masters (four semesters) and Daniel Grin (two semesters), including two 10-week summer internships funded by KINSC fellowship grants.
- Studied the tidal triggering/destruction of bars in galaxies using Galaxy Zoo citizen science data. Incorporated morphological, environmental, and star formation measures to inform a more comprehensive perspective on galaxy evolution.
- Developed mock survey code to generate and observe populations of dark matter haloes under different cosmologies with simulated HI surveys. A manuscript on the limits of galaxy surveys for constraining axion dark matter models is currently in preparation.
- Presented posters and talks at multiple national, local, collaboration, and collegiate consortium meetings.

Work Experience

Haverford College Public Observing — Haverford, PA, USA
Co-Head (2021-2022), Volunteer — *2018 – 2022*

- Organized and ran public events for college and local communities.
- Conducted observing sessions, talks, Q&A sessions, and observatory tours.
- Operated and trained students in the use of 8", 12", and 16" telescopes at Strawbridge Observatory.

Haverford College — Haverford, PA, USA
Teaching Assistant — *Jan 2021 – May 2021*

- Held office hours, assisted with observing sessions, and graded coursework for Astronomy 101.

Awards & Honors

C. A. Chant Fellowship (2023): CA$8,970 awarded to a graduate student in the David A. Dunlap Department of Astronomy and Astrophysics.

Louis B. Green Prize in Physics and Astronomy (2022): Awarded to the graduating students who go above and beyond in their contributions to research and/or department culture and events.

Chambliss Astronomy Achievement Award, Undergraduate Honorable Mention (2022): Awarded for poster presented at the 240th meeting of the American Astronomical Society.

KINSC Scientific Imaging Contest, Honorable Mention (2022): Awarded for student-submitted images from experiments or simulations that are scientifically intriguing as well as aesthetically pleasing. (*Submission*)

Publications

[1] Michael M. Shara, Kenneth M. Lanzetta, **James T. Garland**, Stefan Gromoll, David Valls-Gabaud, et al. "Introducing the Condor Array Telescope: IV. A possible nova super-remnant surrounding the putative recurrent nova KT Eridani". MNRAS 529.1 (2024), pp. 224–235. DOI: 10.1093/mnras/stad3612. arXiv: 2310.17055 [astro-ph.SR].

[2] Michael M. Shara, Kenneth M. Lanzetta, **James T. Garland**, Stefan Gromoll, David Valls-Gabaud, et al. "Introducing the Condor Array Telescope: III. The expansion and age of the shell of the dwarf nova Z Camelopardalis, and detection of a second, larger shell". MNRAS 529.1 (2024), pp. 212–223. DOI: 10.1093/mnras/stad3220. arXiv: 2310.00123 [astro-ph.SR].

[3] Kenneth M. Lanzetta, Stefan Gromoll, Michael M. Shara, Stephen Berg, **James Garland**, et al. "Introducing the Condor Array Telescope. II. Deep imaging observations of the edge-on spiral galaxy NGC 5907 and the NGC 5866 Group: yet another view of the iconic stellar stream". MNRAS 529.1 (2024), pp. 197–211. DOI: 10.1093/mnras/stad3806. arXiv: 2309.17248 [astro-ph.GA].

[4] M. W. Healy-Kalesh, M. J. Darnley, M. M. Shara, K. M. Lanzetta, **J. T. Garland**, et al. "Hydrodynamic simulations of the KT Eridani nova super-remnant". MNRAS 529.1 (2023), pp. 236–244. DOI: 10.1093/mnras/stad3190. arXiv: 2310.17258 [astro-ph.HE].

[5] Anubhav Sharma, Karen L. Masters, David V. Stark, **James Garland**, Niv Drory, et al. "HI rich but low star formation galaxies in MaNGA: Physical properties and comparison to control camples". MNRAS 526.1 (2023), pp. 1573–1587. DOI: 10.1093/mnras/stad2695. arXiv: 2309.04854 [astro-ph.GA].

[6] Michael M. Shara, Steve B. Howell, Elise Furlan, **James T. Garland**, Anthony F. J. Moffat, et al. "Speckle imaging of γ^2 Velorum: the inner wind possibly resolved". MNRAS 525.2 (2023), pp. 3195–3200. DOI: 10.1093/mnras/stad2482. arXiv: 2308.07443 [astro-ph.SR].

[7] Michael M. Shara, Trisha F. Doyle, Ashley Pagnotta, **James T. Garland**, Tod R. Lauer, et al. "A Hubble Space Telescope survey for novae in M87 - III. Are novae good standard candles 15 d after maximum brightness?" MNRAS 474.2 (2018), pp. 1746–1751. DOI: 10.1093/mnras/stx2873. arXiv: 1702.06988 [astro-ph.SR].

[8] Nathan W. C. Leigh, Aaron M. Geller, Michael M. Shara, **James Garland**, Harper Clees-Baron, et al. "Small-N collisional dynamics - III: The battle for the realm of not-so-small-N". MNRAS 471.2 (2017), pp. 1830–1840. DOI: 10.1093/mnras/stx1704. arXiv: 1707.01911 [astro-ph.SR].

Talks & Presentations

Talk, Galaxy Zoo 15th anniversary telecon, Jul 2022. *Exploring the Roles of Galaxy Star Formation and Environment in the Tidal Triggering of Bars.* (*Slides*)

Poster, AAS 240th meeting, Jun 2022. *Exploring the Roles of Galaxy Star Formation and Environment in the Tidal Triggering of Bars.* (*Poster*)

Talk, Galaxy Zoo biweekly telecon, Dec 2021. *Exploring the Roles of Galaxy Star Formation and Environment in the Tidal Triggering of Bars.* (*Slides*)

Talk, 32nd annual Keck Northeast Astronomy Consortium meeting, Sep 2021. *Exploring the Roles of Galaxy Star Formation and Environment in the Tidal Triggering of Bars.* (*Abstract*, *Recording*)

Poster, Haverford KINSC Undergraduate Science Research Symposium, Sep 2021. *Exploring the Roles of Galaxy Star Formation and Environment in the Tidal Triggering of Bars.*

Poster, AAS 237th meeting, Jan 2021. *Can HI Observations of Low-Mass Galaxies Test Ultra-Light Axion Dark Matter?* (*Abstract*, *Poster*)

Poster, Haverford KINSC Undergraduate Science Research Symposium, Oct 2020. *Can We Test Axion Dark Matter Models With Galaxy Surveys?*

Poster, 31st annual Keck Northeast Astronomy Consortium meeting, Oct 2020. *Can HI Observations of Low-Mass Galaxies Test Ultra-Light Axion Dark Matter?* (*Abstract*)

"Lightning talk", 2020 SDSS-IV/V Collaboration Meeting, Jun 2020. *Can HI Observations of Low-Mass Galaxies Test Ultra-Light Axion Dark Matter?*

Skills

Technical: Python, Data Reduction and Analysis, Data Visualization, Optical Telescope Operation, CCD Image Reduction, Observation Planning, Astrophotography

Communications: Proposal Writing, Scientific Writing, Science Communication, Public Outreach

Relevant Coursework

Astronomy (Graduate): Radiation Processes and Gas Dynamics, Observational Techniques

Astronomy (Undergraduate): Intro Astrophysics, Observational Astronomy, Multi-Wavelength Astronomy, Galactic Dynamics & Mechanics (mixed undergraduate & graduate), Gravitational Waves, Extragalactic Data Science

Physics (Undergraduate): Fundamental Physics I-II, Waves and Optics, Advanced Quantum Mechanics, Advanced Classical Mechanics, Advanced Electromagnetism

Misc. (Undergraduate): Multivariable Calculus, Linear Algebra, History of Science