

DR. TOBY BROWN

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Herzberg Astronomy & Astrophysics Research Centre, Victoria, British Columbia, Canada

RESEARCH INTERESTS

Galaxy evolution, interstellar medium, star formation, multi-wavelength astronomy

PROFESSIONAL EXPERIENCE

Plaskett Fellow

May 2021 - present

Herzberg Astronomy & Astrophysics Research Centre

Victoria, BC

National Research Council of Canada

Canada

- PI of VERTICO, an ongoing ALMA Large Program that is studying environmental effects on galaxy evolution by mapping molecular gas at high resolution in 51 Virgo Cluster galaxies
- Completing and facilitating astronomy research through the leadership and participation in large international and cross-discipline collaborations

Research Officer

July 2020 - present

Herzberg Astronomy & Astrophysics Research Centre

Victoria, BC

National Research Council of Canada

Canada

- PI of ARCADE, an ALMA Development Study that is building a fully interactive online platform for cloud-based ALMA data reduction, analysis, and visualisation

Postdoctoral Fellow

October 2017 - June 2020

McMaster University

Hamilton, Canada

- Completed self-directed research and supervised undergraduate and graduate students in Prof. Christine Wilson's research group

EDUCATION

Doctor of Philosophy (Ph.D.), Astrophysics

October 2013 - May 2017

Swinburne University of Technology

Melbourne, Australia

- *The Life Cycle of Nearby Galaxies: internal and external processes regulating atomic gas content*
- Supervisors: Dr. Barbara Catinella, Prof. Luca Cortese, Prof. Virginia Kilborn
- Conferred: September 2017

Astrophysics MPhys, Hons

September 2009 - June 2013

University of Liverpool & Liverpool John Moores University

Liverpool, UK

COMPETITIVE FUNDING AND HONOURS (CAD)

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| NRAO Student Observing Support (co-I, \$48,000) | 2020 |
| ARCADE: ALMA Reduction in the CANFAR Data Environment (PI, \$250,000 + equivalent in-kind) | 2019 |
| NAASC ALMA Ambassador (\$20,000) | 2018 & 2019 |
| Mitacs Globalink Research Award (\$6,000) | 2019 |
| TMT Early-Career Workshop Grant (\$1,800) | 2018 |
| ASTRO-3D Science Visitor Program (\$1,500) | 2018 |
| ACURA Travel Award (\$1,000) | 2018 |
| MacDATA Fellow Supervisor (\$7,500) | 2017 |

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| Famelab Australia Finalist | 2016 |
| ASA Travel Award (\$1,000) | 2015 |
| SUPRA Graduate Scholarship (\$98,000 + Tuition-fee Waiver) | 2013 |

LEADERSHIP AND SERVICE ROLES IN ASTRONOMY

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| Principle Investigator, ARCADE <i>ALMA Cycle 7 Development Study</i> <ul style="list-style-type: none"> · ARCADE is a web-accessible cloud-based computing environment tailored to ALMA users. We will ultimately provide a fully-developed version of ARCADE to the wider astronomical community · As PI, I lead a cross-disciplinary team of astronomers, software developers, project managers, and beta users to successfully develop and deliver ARCADE · Total funding is \$250,000 CAD (\$186,000 USD) from the National Radio Astronomy Observatory with an equivalent contribution of in-kind costs by the National Research Council of Canada. I took over as PI in July 2020 having been co-I on the original proposal | July 2020 - present |
| Principle Investigator, VERTICO <i>Virgo Environment Traced in CO, ALMA Cycle 7 Large Program</i> <ul style="list-style-type: none"> · I have been awarded the VERTICO ALMA Large Program (186 hrs), an ongoing survey that is investigating the effects of environment on galaxy evolution · VERTICO is the first Canadian-led Large Program and the only such program awarded to a postdoc · As PI, I built and lead the VERTICO collaboration of 35 leading international researchers · Survey and team information at bit.ly/verticoALMA | July 2019 - present |
| Chair, Postdoc Committee <i>Canadian Astronomical Society</i> <ul style="list-style-type: none"> · Representing and advocating for astronomy postdocs in Canada | July 2020 - present |
| co-PI (Survey Coordinator), DOWSING <i>James Clerk Maxwell Telescope Large Program</i> <ul style="list-style-type: none"> · JCMT Large Program surveying dust in nearby galaxies | September 2019 - present |
| 2019 and 2020 ALMA Ambassador <i>North American ALMA Science Center</i> <ul style="list-style-type: none"> · Acting as an ALMA resource for the Canadian community · Hosting ALMA preparation workshops and sharing ALMA/interferometry expertise | December 2018 - April 2020 |
| Postdoc Representative <i>Department of Physics & Astronomy, McMaster University</i> | July 2018 - June 2020 |
| Women in Astronomy Working Group Member <i>International Astronomical Union</i> | November 2018 - present |
| SKA HI Galaxy Science Working Group Member <i>Square Kilometer Array Organisation</i> | November 2018 - present |
| Steering Committee Member <i>Early Career Researcher Chapter, Astronomical Society of Australia</i> | May 2016 - May 2017 |
| Student Mentor <i>Swinburne University of Technology</i> | January - October 2015 |
| Scientific Organizing Committee Member <i>ICRARcon, Mandura, Australia</i> | June - September 2016 |

Local Organizing Committee Member*ICRARcon, Mandura, Australia*

June - September 2016

Local Organizing Committee Member*The Role of Neutral Hydrogen in Galaxy Evolution, Borneo, Malaysia*

June - September 2015

SUPERVISING AND TEACHING EXPERIENCE

Co-op Student Supervisor*Dept. Physics & Astronomy, McMaster University*

Sept 2020 - present

Hamilton, Canada

- Primary supervisor of a four month co-op student working on a combined VERTICO-ARCADE project using cloud computing to test and develop VERTICO's radio continuum imaging pipeline

MacDATA Fellow Supervisor*Dept. Physics & Astronomy, & MacDATA Institute, McMaster University*

March 2018 - December 2018

Hamilton, Canada

- Supervisor of McMaster's MacDATA Graduate (PhD level) Fellow

Integrated Science Course Supervisor*McMaster University*

November 2017 - November 2019

*Hamilton, Canada***Teaching Assistant***University of Western Australia*

February - November 2016

*Perth, Australia***Teaching Assistant***Swinburne University of Technology*

February - October 2015

*Melbourne, Australia***Undergraduate Project Supervisor***Swinburne University of Technology*

September 2014 - July 2015

*Melbourne, Australia***CONTRIBUTED CONFERENCE TALKS**

Total number: 8

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| Metals in Galaxies Near and Far, The Lorentz Centre, Leiden, Netherlands | 2019 |
| The Life and Death of Star-Forming Galaxies, Perth, Australia | 2019 |
| KIAA Forum on Gas in Galaxies, Peking University, Beijing, China | 2018 |
| European Week of Astronomy, Liverpool, UK | 2018 |
| MockPerth, Perth, Australia | 2017 |
| Pathfinders HI Science Coordination Committee Meeting, Cape Town, South Africa | 2016 |
| Drifting through the Cosmic Web, Aix-en-Provence, France | 2015 |
| The Many Pathways to Galaxy Growth, Prato, Italy | 2015 |

COLLOQUIA AND SEMINARS

Total number: 26

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| Dominion Radio Astrophysical Observatory, National Research Council of Canada, Penticton, Canada 2021 | |
| National Institutes of Health, Bethesda, MD, USA | 2020 |
| University of Victoria, BC, Canada | 2020 |
| Princeton, Princeton, NJ, USA | 2019 |

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| Rutgers University, New Brunswick, NJ, USA | 2019 |
| Yale University, New Haven, CT, USA | 2019 |
| University of Maryland, College Park, MD, USA | 2019 |
| Harvard–Smithsonian Center for Astrophysics, Cambridge, MA, USA | 2019 |
| National Radio Astronomy Observatory, Charlottesville, VA, USA | 2019 |
| Swinburne University of Technology, Melbourne, Australia | 2019 |
| Carnegie Observatories, Pasadena, CA, USA | 2018 |
| York University, York, Canada | 2018 |
| Royal Military College of Canada, Kingston, Canada | 2018 |
| Queens University, Kingston, Canada | 2018 |
| University of Victoria, Victoria, Canada | 2018 |
| Hertzberg Astronomy and Astrophysics, National Research Council of Canada, Victoria, Canada | 2018 |
| University of British Columbia, Vancouver, Canada | 2018 |
| McMaster University, Hamilton, Canada | 2017 |
| Liverpool John Moores University, Liverpool, UK | 2016 |
| Max Planck Institute for Extraterrestrial Physics, Garching, Germany | 2016 |
| European Southern Observatory, Garching, Germany | 2016 |
| University College London, London, UK | 2016 |
| University of Hertfordshire, Hatfield, UK | 2016 |
| LERMA, l'Observatoire de Paris, Paris, France | 2016 |
| Institut d'astrophysique de Paris, Paris, France | 2016 |
| ICRAR, University of Western Australia, Perth, Australia | 2015 |
| Centre de Recherche Astrophysique de Lyon, Lyon, France | 2015 |

PUBLIC SPEAKING AND COMMUNICATION

Award-winning public talks

- Speaking to audiences of 700+, including the March for Science, the British Council's Famelab Australia Final, British live event series Cosmic Shambles

Media coverage

- Stories on my research have been featured in The Sun (UK), New York Post, Scientific American, Space.com, Gizmodo, IFL Science, among others

Media commentary

- Providing comment on STEM issues for local and national media, including The Conversation, CBC/Radio-Canada, Australian Broadcasting Corporation

LEADERSHIP ROLES OUTSIDE ASTRONOMY

Chair, Negotiating Committee

Canadian Union of Public Employees - Local 3906

October 2018 - December 2020

Hamilton, Canada

- Elected to represent all postdocs in contract negotiations with McMaster University leadership

Field Director
Municipal Council Election Campaign

July - October 2018
Hamilton, Canada

Senior Field Organiser
Ontario New Democratic Party

April - June 2018
Hamilton, Canada

Political Action Committee Member
Canadian Union of Public Employees - Local 3906

January - September 2018
Hamilton, Canada

SURVEY MEMBERSHIPS

VERTICO (Virgo Environment Traced in CO, PI Brown)

CANUCS (Canadian NIRISS Unbiased Cluster Survey, external collaborator, PI Willott)

DOWSING (Dust Observations With Scuba-2 In Nearby Galaxies, Survey Coordinator, PI Smith)

WALLABY (The ASKAP HI All-Sky Survey, PIs Koribalski, Staveley-Smith)

JINGLE (JCMT dust and gas In Nearby Galaxies Legacy Exploration, PI Wilson)

HIX (HI eXcess galaxy survey, PI Lutz)

Since beginning my PhD I have 17 total publications, 15 of which are refereed articles published in leading journals (e.g., *Astronomy & Astrophysics* - impact factor = 6.2, *The Astrophysical Journal* - IF = 5.58, *Monthly Notices of the Royal Astronomical Society* - IF = 5.23).

As of 31 January 2021, my total citation count is 368, and my first-author citation count is 200. For context, I am 3.5 years from my PhD (Sept. 2017).

REFEREED JOURNAL ARTICLES

15. Lutz, K. A.; Kilborn, V.; Catinella, B.; Cortese, L.; **Brown, T.**; Koribalski, B., 2020, *The HIX galaxy survey III: The gas-phase metallicity in HI eXtreme galaxies*, *A&A*, 635, id.A69
14. Gao, Y.; Xiao, T.; Li, C.; Jiang, X.; Tan, Q.; Gao, Y.; Wilson, C.D.; Bureau, M.; Saintonge, A.; Sánchez-Gallego, J.R.; **Brown, T.**; Clark, C.J.R.; Hwang, H.S.; Lamperti, I.; Lin, L.; Liu, L.; Lu, D.; Pan, H.; Sun, J.; Williams, T.G., 2019, *Estimating the molecular gas mass of low-redshift galaxies from a combination of mid-infrared luminosity and optical properties*, *ApJ*, 887, 2
13. Lamperti, I.; Saintonge, A.; De Looze, I.; Accurso, G.; Clark, C.J.R.; Smith, M.W.L.; Wilson, C.D.; Brinks, E.; **Brown, T.**; Bureau, M.; Clements, D.L.; Eales, S.; Glass, D.H.W.; Hwang, H.S.; Lee, J.C.; Lin, L.; Michalowski, M.J.; Sargent, M.; Williams, T.G.; Xiao, T.; Yang, C., 2019, *JINGLE V: Dust properties of nearby galaxies derived from hierarchical Bayesian SED fitting*, *MNRAS*, 489, 3
12. **Brown, T.** & Wilson, C.D., 2019, *Extreme CO Isotopologue Line Ratios in ULIRGS: Evidence for a Top-heavy IMF*, *ApJ*, 879, 17
11. Stevens, A.R.H.; Diemer, B.; Lagos, C.d.P.; Nelson, D.; Pillepich, A.; **Brown, T.**; Catinella, B.; Hernquist, L.; Weinberger, R.; Vogelsberger, M.; Marinacci, F., 2019, *Atomic hydrogen in IllustrisTNG galaxies: the impact of environment paralleled with local 21-cm surveys*, *MNRAS*, 483, 5334
10. Roberts, I.D.; Parker, L.; **Brown, T.**; Joshi, G.; Hlavacek-Larrondo, J.; Wadsley J., 2018, *Quenching low-mass satellite galaxies: evidence for a threshold ICM density*, *ApJ*, 873, 42
9. Ellison S.L.; **Brown, T.**; Catinella, B.; Cortese, L., 2018, *Atomic gas fractions in active galactic nucleus host galaxies*, *MNRAS*, 482, 5694
8. Saintonge, A.; Wilson, C.D.; Xiao, T.; Lin, L.; Hwang, H.S.; Tosaki, T.; Bureau, M.; Cigan, P.J.; Clark, C.J.R.; Clements, D. L.; De Looze, I.; Dharmawardena, T.; Gao, Y.; Gear, W.K.; Greenslade, J.; Lamperti, I.; Lee, J.C.; Li, C.; Michałowski, M.J.; Mok, A.; Pan, H.A.; Sansom, A.E.; Sargent, M.; Smith, M.W.L.; Williams, T.; Yang, C.; Zhu, M.; Accurso, G.; Barmby, P.; Brinks, E.; Bourne, N.; **Brown, T.** and the JINGLE Survey Team, 2018, *JINGLE, a JCMT legacy survey of dust and gas for galaxy evolution studies - I. Survey overview and first results*, *MNRAS*, 481, 3497
7. Pan, H-A.; Lin, L.; Hsieh, B-C.; Xiao, T.; Gao, Y.; Ellison, S.L.; Scudder, J.M.; Barrera-Ballesteros, J.; Yuan, F.; Saintonge, A.; Wilson, C.D.; Hwang, H.S.; De Looze, I.; Gao, Y.; Ho, L.C.; Brinks, E.; Mok, A.; **Brown, T.**; Davis, T.A.; Williams, T.G.; Chung, A.; Parsons, H.; Bureau, M.; Sargent, M.T.; Chung, E.J.; Kim, E.; Liu, T.; Michałowski, M.J.; Tosaki, T., 2018, *The Effect of Galaxy Interactions on Molecular Gas Properties*, *ApJ*, 868, 132
6. **Brown, T.**; Cortese, L.; Catinella, B.; Kilborn, V.A, 2018, *The role of atomic hydrogen in regulating the scatter of the mass–metallicity relation*, *MNRAS*, 473, 1868
5. Stevens, A. & **Brown, T.**, 2017, *Physical drivers of galaxy atomic gas content: exploring environmental and evolutionary effects with Dark Sage*, *MNRAS*, 471, 447
4. Lutz, K. A.; Kilborn, V.A.; Catinella, B.; Koribalski, B. S.; **Brown, T.**; Cortese, L.; Denes, H.; Jozsa, G. I. G.; Wong, O. I., 2017, *The HIX galaxy survey I: Study of the most gas rich galaxies from HIPASS*, *MNRAS*, 467, 1083

3. Janowiecki, S.; Catinella B.; Cortese, L.; Saintonge, A.; **Brown, T.**, Wang, J., 2017, *xGASS: Exceptionally gas-rich central galaxies in small groups and their connections to pre-processing and galaxy evolution*, MNRAS, 466, 4795
2. **Brown, T.**; Catinella, B.; Cortese, L.; Lagos, C.d.P. ; Dave, R.; Kilborn, V.A.; Haynes, M.P.; Giovanelli, R.; Rafiee-Rantsoa, M., 2017, *Cold gas stripping in satellite galaxies: from pairs to clusters*, MNRAS, 466, 1275
1. **Brown, T.**; Catinella, B.; Cortese, L.; Kilborn, V.A.; Haynes, M.P.; Giovanelli, R., 2015, *The effect of structure and star formation on the gas content of nearby galaxies*, MNRAS, 452, 2479

WHITE PAPERS

1. Ngo, H.; Kirk, H.; **Brown, T.**; Woods, T.E.; Eadie, G.; Lawler, S.; Spencer, L., 2019, *Opportunities and Outcomes for Postdocs in Canada*, arXiv:1911.10320
2. Spekkens, K.; Chiang, C.; Kothes, R.; Rosolowsky, E.; Rupen, M.; Safi-Harb, S.; Sievers, J.; Sivakoff, G.; Stairs, I.; van der Marel, N.; Abraham, B.; Alexandroff, R.; Bartel, N.; Baum, S.; Bietenholz, M.; Boley, A.; Bond, D.; Brown, J.; **Brown, Toby**; ..., 2019, *Canada and the SKA from 2020-2030*, arXiv:1911.03250