

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)

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

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

Principle Investigator, ARCADE <i>ALMA Cycle 7 Development Study</i>	July 2020 - present
<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 	
Principle Investigator, VERTICO <i>Virgo Environment Traced in CO, ALMA Cycle 7 Large Program</i>	July 2019 - present
<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 	
Chair, Postdoc Committee <i>Canadian Astronomical Society</i>	July 2020 - present
<ul style="list-style-type: none"> · Representing and advocating for astronomy postdocs in Canada 	
Survey Coordinator, DOWSING <i>James Clerk Maxwell Telescope Large Program</i>	September 2019 - present
<ul style="list-style-type: none"> · JCMT Large Program surveying dust in nearby galaxies 	
2019 and 2020 ALMA Ambassador <i>North American ALMA Science Center</i>	December 2018 - April 2020
<ul style="list-style-type: none"> · Acting as an ALMA resource for the Canadian community · Hosting ALMA preparation workshops and sharing ALMA/interferometry expertise 	
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 <i>ICRARcon, Mandura, Australia</i>	June - September 2016
Local Organizing Committee Member <i>The Role of Neutral Hydrogen in Galaxy Evolution, Borneo, Malaysia</i>	June - September 2015

SUPERVISING AND TEACHING EXPERIENCE

Co-op Student Supervisor <i>Dept. Physics & Astronomy, McMaster University</i>	Sept 2020 - present <i>Hamilton, Canada</i>
· 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 <i>Dept. Physics & Astronomy, & MacDATA Institute, McMaster University</i>	March 2018 - December 2018 <i>Hamilton, Canada</i>
· Supervisor of McMaster's MacDATA Graduate (PhD level) Fellow	
Integrated Science Course Supervisor <i>McMaster University</i>	November 2017 - November 2019 <i>Hamilton, Canada</i>
Teaching Assistant <i>University of Western Australia</i>	February - November 2016 <i>Perth, Australia</i>
Teaching Assistant <i>Swinburne University of Technology</i>	February - October 2015 <i>Melbourne, Australia</i>
Undergraduate Project Supervisor <i>Swinburne University of Technology</i>	September 2014 - July 2015 <i>Melbourne, Australia</i>

CONTRIBUTED CONFERENCE TALKS

Total number: 8

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

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

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.; Rafieferantsoa, 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