

# DR. TOBY BROWN

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Department of Physics and Astronomy, McMaster University, Hamilton, Canada

## RESEARCH INTERESTS

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Extragalactic astronomy, galaxy evolution, star formation, observational astronomy

## PROFESSIONAL EXPERIENCE

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### Postdoctoral Fellow

October 2017 - present

*Department of Physics and Astronomy*

*McMaster University, Hamilton, Canada*

- Devising, leading, and completing successful research programs on galaxy formation and evolution
- P.I. of VERTICO, an ALMA Large Program that is mapping molecular gas in 51 Virgo Cluster galaxies
- Supervising PhD and undergraduate students in astrophysics and machine learning
- Speaking at international conferences, research institutions and public events
- Collaborating with leading experts to form productive international partnerships

## EDUCATION

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### Business Administration with Management

May 2018 - present

*McMaster University CCE*

*Hamilton, Canada*

- Continued education to ensure a strong foundation in business competencies, including finance, operations, and general management

### Doctor of Philosophy (Ph.D.), Astrophysics

October 2013 - August 2017

*Swinburne University of Technology*

*Melbourne, Australia*

- Large multi-wavelength study of the gas and star formation cycle of nearby galaxies
- Supervisors: Dr. Barbara Catinella (primary), Dr. Luca Cortese, Prof. Virginia Kilborn

### Astrophysics MPhys, Hons

September 2009 - June 2013

*University of Liverpool & Liverpool John Moores University*

*Liverpool, UK*

## COMPETITIVE FUNDING AND HONOURS

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ARCADE: ALMA Reduction in the CANFAR Data Environment (co-I, \$250,000)	2019
MITACS Globalink Research Award (\$6,000)	2019
NAASC ALMA Ambassador (\$13,500)	2018
ASTRO-3D Science Visitor Program (\$1,500)	2018
TMT Early-Career Workshop Grant (\$1,800)	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

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### **Principle Investigator, VERTICO**

*Virgo Environment Traced in CO*

July 2019 - present

*ALMA Cycle 7 Large Program*

- Awarded ~200 ALMA hours as P.I. of VERTICO, the first Canadian-led ALMA Large Program
- VERTICO will map the molecular gas content of 51 Virgo Cluster galaxies
- Assembling and managing the VERTICO collaboration of ~30 world-class researchers
- Ensuring maximum impact and legacy value by coordinating projects and collaborations

### **NAASC ALMA Ambassador**

*North American ALMA Science Center*

December 2018 - present

*Charlottesville, Virginia*

- Acting as an ALMA resource for the Canadian community
- Hosting ALMA preparation workshops and sharing ALMA/interferometry expertise

### **Women in Astronomy Working Group Member**

*International Astronomical Union*

November 2018 - present

- Assess and report on the status of gender equality in astronomy and recommend future actions that will improve the environment for all astronomers

### **SKA HI in Galaxies Working Group Member**

*Square Kilometer Array Organisation*

November 2018 - present

### **Steering Committee Member**

*Early Career Researcher Chapter*

May 2016 - May 2017

*Astronomical Society of Australia*

- Advocating for and representing early career astronomers in Australia including establishing legacy database of students and postdocs who have left the field

### **Student Mentor**

*Swinburne University of Technology*

January - October 2015

*Melbourne, Australia*

### **Scientific Organizing Committee Member**

- ICRARcon, Mandurah, Western Australia, 2016

### **Local Organizing Committee Member**

- ICRARcon, Mandurah, Western Australia, 2016
- The Role of Neutral Hydrogen in Galaxy Evolution, Kuching, Borneo, 2015

## SUPERVISING AND TEACHING EXPERIENCE

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### **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
- Won \$18,000 grant to pay student salary for 9 month astronomy-data science collaboration

### **Integrated Science Project Supervisor**

*McMaster University*

November 2017 - present

*Hamilton, Canada*

- Supervisor for 14 high-achieving undergraduate students pursuing an Integrated Science degree
- Teaching and mentoring using problem-based learning and peer instruction

### **Teaching Assistant**

*University of Western Australia*

February - November 2016

*Perth, Australia*

- Demonstrating, supervising and grading *Quantum Mechanics and Electromagnetism* labs and tutorials

### **Teaching Assistant**

*Swinburne University of Technology*

February - October 2015

*Melbourne, Australia*

- Demonstrating, supervising and grading *Electronic Systems* labs and tutorials

## **Undergraduate Project Supervisor**

*Swinburne University*

September 2014 - July 2015

*Melbourne, Australia*

- Supervising 4 final year Animation undergraduate student projects

## **LEADERSHIP ROLES OUTSIDE ASTRONOMY**

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### **Bargaining Committee Chair**

*Canadian Union of Public Employees - Local 3906*

October 2018 - present

*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*

- Devising campaign strategy and coordinating approximately 120 volunteers
- Campaign data analytics lead

### **Senior Field Organiser**

*Ontario New Democratic Party*

April - June 2018

*Hamilton, Canada*

- Coordinating approximately 200 volunteers for ONDP leader's successful re-election campaign
- Led the campaign's final volunteer organisation phase and consulted on data analytics

### **Political Action Committee Member**

*Canadian Union of Public Employees - Local 3906*

January - September 2018

*Hamilton, Canada*

- Oversee political donations, events and awareness campaigns of union

## **CONTRIBUTED CONFERENCE TALKS**

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*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

## **PUBLIC SPEAKING AND COMMUNICATION**

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### **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 Scientific American, News.com.au, The Daily Telegraph, Space.com, Gizmodo, IFL Science, among others

### **Media commentary**

- Providing comment on STEM issues for local and national media, including The Conversation, ABC Radio National, ABC 720 Perth, ABC Melbourne

## COLLOQUIA AND SEMINARS

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*Total number: 18*

Swinburne University of Technology, Melbourne, Australia	2019
Carnegie Observatories, Pasadena, CA, USA	2018
University of York, York, Canada	2018
Royal Military College of Canada, Kingston, Canada	2018
Queens University, Kingston, Canada	2018
University of Victoria, Victoria, Canada	2018
National Research Council Hertzberg Astronomy and Astrophysics, 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

## SURVEY MEMBERSHIPS

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WALLABY (The ASKAP HI All-Sky Survey, PIs Koribalski, Staveley-Smith)  
JINGLE (JCMT dust and gas In Nearby Galaxies Legacy Exploration, PI Wilson)  
DINGO (Deep Investigation of Neutral Gas Origins, PI Meyer)  
xGASS (extended GALEX Arecibo SDSS Survey, PI Catinella)  
HIX (HI eXcess galaxy survey, PI Lutz)

## DR. TOBY BROWN - LIST OF PUBLICATIONS (4 FIRST AUTHOR, 8 CO-AUTHOR)

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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