

Ian D. Roberts

Banting Fellow, University of Waterloo
ianr@uwaterloo.ca

Citizenship(s): Canada

Academic Positions

Banting Fellow	2024 –
Waterloo Centre for Astrophysics, University of Waterloo, Canada	
Waterloo Centre for Astrophysics Fellow	2024 –
Waterloo Centre for Astrophysics, University of Waterloo, Canada	
Postdoctoral Research Associate	2020 – 2023
Leiden Observatory, Leiden University, The Netherlands	

Education

Doctor of Philosophy

Department of Physics and Astronomy, McMaster University, Hamilton ON, Canada
Thesis: *Galaxy Clusters and Their Role in Galaxy Evolution*
Advisor: Dr. Laura Parker
2016-2020

Masters of Science

Department of Physics and Astronomy, McMaster University, Hamilton ON, Canada
Thesis: *Galaxy Properties Across Diverse Halo Environments*
Advisor: Dr. Laura Parker
2014-2016

Bachelors of Science, Honours with Distinction

Department of Physics, Mount Allison University, Sackville NB, Canada
Minors: Astronomy, Mathematics
Thesis: *Simulation of Double-Peaked Meteor Light Curves*
Advisor: Dr. Bob Hawkes
2010-2014

Refereed Publications

★ denotes students of Ian Roberts

First-author and student-led:

17. ★Broderick A.O., **Roberts I.D.**, Hudson M.J., *Truncated star formation and ram pressure stripping in the Coma Cluster*, ApJ, submitted.
16. **Roberts I.D.**, van Weeren R.J., de Gasperin F., Botteon A., Edler H.W., et al., *A 100 kpc ram pressure tail trailing the group galaxy NGC 2276*, A&A, 689, A22.
15. **Roberts I.D.**, *Merger shocks enhance quenching in local galaxy clusters*, ApJ, 971, 182.
14. **Roberts I.D.**, van Weeren R.J., Lal D.V., Sun M., Chen H., et al., *Radio-continuum spectra of ram pressure stripped galaxies in the Coma Cluster*, 2024, A&A, 683, A11.
13. **Roberts I.D.**, Brown T., Zabel N., Wilson C.D., Chung A., et al., *VERTICO VI: Cold-gas asymmetries in Virgo Cluster galaxies*, 2023, A&A, 675, A78.
12. **Roberts I.D.**, ★Lang M., ★Trotsenko D., Bemis A., Ellison S.L., et al., *LoTSS Jellyfish Galaxies IV: Enhanced*

star formation on the leading half of cluster galaxies and gas compression in IC3949, 2022, ApJ, 941, 77.

11. **Roberts I.D.**, van Weeren R.J., Timmerman R., Botteon A., Gendron-Marsolais M.-L., et al., *LoTSS Jellyfish Galaxies: III. The first identification of jellyfish galaxies in the Perseus Cluster*, 2022, A&A, 658, A44.
10. **Roberts I.D.**, Parker L.C., Gwyn S., Hudson M., Carlberg R., et al., *Ram pressure candidates in UNIONS*, 2022, MNRAS, 509, 1342.
9. **Roberts I.D.**, van Weeren R.J., McGee S.L., Botteon A., Ignesti A., et al., *LoTSS Jellyfish Galaxies: II. Ram pressure stripping in groups versus clusters*, 2021, A&A, 652, A153.
8. **Roberts I.D.**, van Weeren R.J., McGee S.L., Botteon A., Drabant A., et al., *LoTSS Jellyfish Galaxies: I. Radio tails in low redshift clusters*, 2021, A&A, 650, A111.
7. **Roberts I.D.**, Parker L.C., *Ram pressure candidates in the Coma Cluster: Evidence for enhanced star formation*, 2020, MNRAS, 495, 554.
6. **Roberts I.D.**, Parker L.C., “*Observing*” *unrelaxed clusters in dark matter simulations*, 2019, MNRAS, 490, 773.
5. **Roberts I.D.**, Parker L.C., Brown T., Joshi G.D., Hlavacek-Larrondo J., et al., *Quenching low-mass satellite galaxies: evidence for a threshold ICM density*, 2019, ApJ, 873, 42.
4. **Roberts I.D.**, Parker L.C., Hlavacek-Larrondo J., *Connecting optical and X-ray tracers of galaxy cluster relaxation*, 2018, MNRAS, 475, 4704.
3. **Roberts I.D.**, Parker L.C., *Evidence of pre-processing and a dependence on dynamical state for low-mass satellite galaxies*, 2017, MNRAS, 467, 3268.
2. **Roberts I.D.**, Parker L.C., Karunakaran A., *Comparing galaxy morphology and star-formation properties in X-ray bright and faint groups and clusters*, 2016, MNRAS, 455, 3628.
1. **Roberts I.D.**, Parker L.C., Joshi G.D., Evans F.A., *Mass segregation trends in SDSS galaxy groups*, 2015, MNRAS Letters, 448, L1.

Co-author:

23. Rickel M., Moravec E., Gordon Y.A., Bilton L., Pierce J.C.S., et al. incl. **Roberts I.D.**, *Merging Galaxy Cluster Environment Affects the Morphology of Radio Galaxies*, ApJ, submitted.
22. van Weeren R.J., Timmerman R., Vaidya V., Gendron-Marsolais M.-L., Botteon A., et al. incl. **Roberts I.D.**, *LOFAR high-band antenna observations of the Perseus Cluster: The discovery of a giant radio halo*, A&A, submitted.
21. van der Jagt S., Osinga E., van Weeren R.J., Miley G.K., **Roberts I.D.**, et al., *Tailed radio galaxies in the Chandra-Planck sample of massive clusters*, A&A, submitted.
20. Bemis A.R., Wilson C.D., Sharda P., and **Roberts I.D.**, *Does the HCN/CO ratio trace the fraction of gravitationally-bound gas? II. A radiative transfer perspective*, A&A, submitted.
19. Edler H.W., **Roberts I.D.**, Boselli A., de Gasperin F., Heesen V., et al., *ViCTORIA project: The LOFAR-view of environmental effects in Virgo Cluster star-forming galaxies*, 2024, A&A, 683, A149.
18. Hu D., Zajaček M., Werner N., Grossová R., Jáchym P., et al. incl. **Roberts I.D.**, *Ram-pressure stripped radio tail and two ULXs in the spiral galaxy HCG 97b*, 2024, MNRAS, 527, 1062.
17. Stevens A.R.H., Brown T., Diemer B., Pillepich A., Hernquist L., et al. incl. **Roberts I.D.**, *VERTICO VIII: Comparing the spatially resolved effects of environment on galactic gas with IllustrisTNG*, 2023, ApJL, 957, L19.
16. Ignesti A., Brienza M., Vulcani B., Poggianti B.M., Marasco A., et al. incl. **Roberts I.D.**, *On the encounter between the GASP galaxy JO36 and the radio plume of GIN 049*, 2023, ApJ, 956, 122.
15. Brown T., **Roberts I.D.**, Thorp M., Ellison S.L., Zabel N., et al., *VERTICO VII: Environmental suppression of molecular gas content and star formation efficiency in Virgo Cluster galaxies*, 2023, ApJ, 956, 37.

14. Edler H.W., de Gasperin F., Shimwell T.W., Hardcastle M.J., Boselli A., et al. incl. **Roberts I.D.**, *ViCTORIA: The LOFAR HBA Virgo Cluster survey*, 2023, A&A, 676, A24.
13. Ignesti A., Vulcani B., Botteon A., Poggianti B., Giunchi E., et al. incl. **Roberts I.D.**, *Radio continuum tails in ram pressure-stripped spiral galaxies: Experimenting with a semi-empirical model in Abell 2255*, 2023, A&A, 675, A118.
12. Watts A.B., Cortese L., Catinella B., Brown T., Wilson C.D., et al. incl. **Roberts I.D.**, *VERTICO V: The complex, environmentally-driven evolution of the inner cold gas discs of Virgo Cluster galaxies*, 2023, PASA, 40, e017.
11. Jiménez-Donaire M., Brown T., Wilson C.D., **Roberts I.D.**, Zabel N., et al., *VERTICO III: The Kennicutt-Schmidt relation in Virgo Cluster galaxies*, 2023, A&A, 671, A3.
10. Villanueva V., Bolatto A.D., Vogel S., Brown T., Wilson C.D., et al. incl. **Roberts I.D.**, *VERTICO IV: Environmental effects on the gas distribution and star formation efficiency of Virgo Cluster spirals*, 2022, ApJ, 940, 176.
9. Ignesti A., Vulcani B., Poggianti B.M., Moretti A., Shimwell T., et al. incl. **Roberts I.D.**, *Walk on the Low Side: LOFAR explores the low-frequency radio emission of GASP jellyfish galaxies*, 2022, ApJ, 937, 58.
8. Lal D.V., Lyskova N., Zhang C., Venturi T., Forman W.R. et al. incl. **Roberts I.D.**, *High-resolution, high sensitivity, low frequency uGMRT view of Coma Cluster of Galaxies*, 2022, ApJ, 934, 170.
7. Smith R., Shinn J.-H., Tonnesen S., Calderón-Castillo P., Crossett J., et al. incl. **Roberts I.D.**, *A new method to constrain the appearance and disappearance of observed jellyfish galaxy tails*, 2022, ApJ, 934, 86.
6. Zabel N., Brown T., Wilson C.D., Davis T.A., Cortese L., et al. incl. **Roberts I.D.**, *VERTICO II: How HI-identified environmental mechanisms affect the molecular gas in cluster galaxies*, 2022, ApJ, 933, 10.
5. Kotecha S., Welker C., Zhou Z., Wadsley J., Kraljic K., et al. incl. **Roberts I.D.**, *Cosmic filaments delay quenching inside clusters*, 2022, MNRAS, 512, 926.
4. Ignesti A., Vulcani B., Poggianti B.M., Paladino R., Shimwell T., et al. incl. **Roberts I.D.**, *GASP XXXVIII: The LOFAR-MeerKAT-JVLA view on the non-thermal side of a jellyfish galaxy*, 2022, ApJ, 924, 64.
3. Brown T., Wilson C.D., Zabel N., Davis T., Boselli A., et al. incl. **Roberts I.D.**, *VERTICO: The Virgo environment traced in CO survey*, 2021, ApJS, 257, 21.
2. Demers M.L., Parker L.C., **Roberts I.D.**, *Smaller stellar disc scale lengths in rich environments*, 2019, MNRAS, 489, 2216.
1. Evans, F.A., Parker L.C., **Roberts I.D.**, *Red misfits in the Sloan Digital Sky Survey: Properties of star-forming red galaxies*, 2018, MNRAS, 476, 5284.

In proceedings:

2. Zabel N., Brown T., **Roberts I.D.**, Serra P., de Gasperin F., *Resolved studies of the atomic and molecular gas in cluster galaxies in the era of ALMA, MeerKAT, and the SKA*, 2024, Proceedings of the International Astronomical Union.
1. **Roberts I.D.**, Hawkes R.L., Weryk R.J., Campbell-Brown M.D., Brown P.G., Stokan E., Subasinghe D., *Meteoroid structure and ablation implications from multiple maxima meteor light curves*, 2014, Proceedings of the Meteoroids Conference, ed: Jopek T.J., Rietmeijer F., Watanabe J., Williams I.P., 155

Research Supervision

- Lauren Foster (PhD), McMaster University, 2024 – *secondary supervisor*
- Simon Blasby (Bachelors), University of Waterloo, 2024 *primary supervisor*
- Ariel Broderick (Bachelors), University of Waterloo, 2024 *primary supervisor*

- Cam Morgan (PhD), University of Waterloo, 2024 – *secondary supervisor*
- Emily Rock (Bachelors), University of Waterloo, 2024 *primary supervisor*
- Rashmi Gottumukkala (Summer Student), Leiden/ESA Astrophysics Program, 2022 *secondary supervisor*
- Daria Trotsenko (Summer Student), Leiden/ESA Astrophysics Program, 2022 *primary supervisor*
- Federica Mauro (Masters), Leiden Observatory, 2021 *primary supervisor*
- Maojin Lang (Masters), Leiden Observatory, 2021 *primary supervisor*
- Shaojin Huang (Bachelors), McMaster University, 2019 *primary supervisor*

Awards & Recognitions

- Banting Fellowship, **\$140,000 over 2yr**
- Honourable mention for the J.S. Plaskett medal for most outstanding Canadian doctoral thesis in astronomy or astrophysics
- Ontario Graduate Scholarship (Doctoral), **\$15,000**
- Dawes Memorial Fellowship for Graduate Studies in Physics, **\$2,000**
- NSERC Post Graduate Scholarship (Doctoral), **\$105,000 over 3yr**
- Ontario Graduate Scholarship (Masters), **\$15,000**
- NSERC Post Graduate Scholarship (Masters), **\$17,500**
- McMaster University Graduate Scholarship, **\$2,500**
- McMaster University Entrance Scholarship, **\$3,000**
- Marjorie Young Bell Summer Research Grant, **\$6,250**
- Mount Allison University Entrance Scholarship, **\$32,000 over 4yr**
- Mount Allison University Dean's List: 2010-11, 2011-12, 2012-13, 2013-14

Accepted Observing Programs

Principal investigator:

- **Roberts I.D.**, Bemis A.R., Davis T., Hudson M.H., Ignesti A., McGee S.L., Parker L.C., van Weeren R.J., Zabel N., William Herschel Telescope, WEAVE semester 2024A2/B1, 25 hr (dark time), *The Coma Legacy Integral Field Survey (CLIFS): High-mass galaxy sample*.
- **Roberts I.D.**, van Weeren R.J., Ignesti A., Tomicic N., Upgraded Giant Metrewave Radio Telescope, Cycle 45, 22 hr, *Mapping the Low-Frequency Spectrum of NGC2276 and its Extreme Stripped Tail*.
- **Roberts I.D.**, Hudson M.H., Ignesti A., McGee S.L., van Weeren R.J., William Herschel Telescope, WEAVE semester 2023B1/2024A1, 28 hr (dark time), *Resolved Spectroscopy of Coma Jellyfish Galaxies and Their Stripped Tails*.
- **Roberts I.D. (co-PI)**, Parker L.C. (co-PI), van Weeren R.J., Ignesti A., Tomicic N., Gemini semester 2022B, GN-2023B-Q-319, 10.2 hr, *Star Formation Inside and Outside of the Extreme Galaxy NGC 2276*.
- **Roberts I.D. (co-PI)**, Parker L.C. (co-PI), van Weeren R.J., Ignesti A., Tomicic N., Gemini semester 2022B, GN-2022B-Q-222, 9.6 hr, *Star Formation Inside and Outside of the Extreme Galaxy NGC 2276*.
- **Roberts I.D.**, van Weeren R.J., McGee S.L., Isaac Newton Telescope semesters 2021B & 2022A, Large Program, 24 nights (15 dark, 9 gray), *H-alpha Imaging of Jellyfish Galaxies in Groups*.
- **Roberts I.D.**, Bemis A., Brown T., Ellison S., McGee S.L., Parker L.C., Spekkens K., van Weeren R.J., Wilson C., Zabel N., ALMA Cycle 8 2021, 13 hr (C grade), *Resolving Molecular Gas and Star Formation in Coma Cluster Jellyfish*.

- **Roberts I.D.**, Parker L.C., Hlavacek-Larrondo J., Edwards L.O.V., Gemini semester 2019A, GN-2019A-Q-311, 18.0 hr, *Mapping central emission in cool-core groups*.
- **Roberts I.D.**, Parker L.C., Hlavacek-Larrondo J., Edwards L.O.V., Gemini semester 2018A, GN-2018A-Q-211, 13.5 hr, *Mapping central emission in cool-core groups*.

Co-investigator:

- Tomicic N., et al. (**Roberts I.D., co-I**), Astrosat Cycle A13, A13_064, 10ks, *Star formation as a laboratory for extra-galactic forces: a battle between two foes, gravity and ram pressure*.
- Miley G., et al. (**Roberts I.D., co-I**), LOFAR Cycle 20, LC20_004, 30h, *Deep ILT observations of Coma A (3C277.3) : A unique laboratory of jet-induced star formation*.
- Brown T., et al. (**Roberts I.D., co-I**), ALMA Cycle 7, 2019.1.00763.L, Large Program, ~200 hr, *VERTICO: The Virgo Environment Traced in CO*.

Professional Associations

- Principal Investigator, Coma Legacy Integral Field Survey (CLIFS), 2023 –
- Member, Canadian Astronomical Society, 2014 –
- Member, Virgo Environment Traced in CO (VERTICO) Collaboration, 2019 –
- Member, LOFAR Key Surveys Project Collaboration, 2020 –
- Member, Ultraviolet Near-Infrared Optical Northern Survey (UNIONS) Collaboration, 2020 –

Outreach and Service

- Local Organizing Committee Member - 2022 LOFAR Early Career Scientists Meeting
- Coordinator of the PhD Colloquia, Leiden Observatory, 2021 – 2023
- Invited referee for: ApJ, A&A, MNRAS, PASA, PASJ, CanTAC, GMRT-TAC
- Speaker at Astronomy on Tap Leiden
- Manager of the William J. McCallion Planetarium, 2016 – 2020
- Member of McMaster Sidewalk Astronomy, 2015 – 2020
- Presenter at William J. McCallion Planetarium, 2014 – 2020
- Presenter at McMaster Origins 3D Theatre, 2014 – 2016

Teaching

Head teaching assistant, Introductory Physics, McMaster University, 2015-2020

Teaching assistant, McMaster University, 2014-2016

Courses including: Electricity and Magnetic Fields, Big Questions in Astronomy, Introductory Mechanics

Teaching assistant, Mount Allison University, 2011-2014

Courses including: General Physics, Solar System Astronomy, Stars Galaxies and the Universe

Seminars & Invited Talks

- McMaster University, *Galaxy Evolution in the Nearest, Massive Galaxy Cluster*, 2024
- University of Waterloo, *A Panchromatic View of Ram Pressure Stripping in Nearby Groups and Clusters*, 2024
- The University of Alabama in Huntsville, *A Multiwavelength View of Ram Pressure Stripping in Groups and Clusters*, 2023
- The University of Victoria, *Enhanced Star Formation on the Leading Half of Cluster Galaxies and Gas Compression in IC3949*, 2022

- Leiden/ESA Astrophysics Summer Student Program, *Tips and Tricks for Making Beautiful (and effective) Astronomical Figures*, 2022
- CANVAS Lecture Series, *Ram Pressure Stripping in Nearby Groups & Clusters: A Low Frequency Perspective*, 2022
- Max Planck Institut für Astronomie, *Identifying Ram Pressure Stripping from the Low-frequency Radio Continuum*, 2021
- Netherlands Institute for Radio Astronomy, *Fishing for Jellyfish Galaxies with LOFAR*, 2021
- Leiden Observatory, *Fishing for Jellyfish: The Evolution of Galaxies in Dense Environments*, 2020
- McMaster University, *Quenching Low Mass Galaxies: Evidence for a Threshold ICM Density*, 2019
- Université de Montréal, *The Dependence of Galaxy Properties on Group Dynamical State*, 2017

Contributed Talks

- *Gas Compression from Ram Pressure in Nearby Cluster Galaxies*, 2022, The Netherlands ALMA Science Day, The Netherlands.
- *The LoTSS Jellyfish Galaxy Sample*, 2022, LOFAR Early Career Researchers Meeting, Leiden, The Netherlands.
- *A Low Frequency Perspective on Ram Pressure Stripping (+ Enhanced SFRs on the Leading Edge)*, 2022, Epoch of Galaxy Quenching 2022, Cambridge, United Kingdom.
- *Studying Ram Pressure Stripping with the Canada-France Imaging Survey*, 2021, UNIONS Collaboration Meeting, virtual meeting.
- *Linking star formation quenching and ICM density*, 2020, Quenching and Transformation Throughout Cosmic Time, Aspen, United States.
- *Quenching low-mass satellite galaxies: evidence for a threshold ICM density*, 2020, Meeting of the American Astronomical Society, Honolulu, United States.
- *Quenching low-mass satellite galaxies: evidence for a threshold ICM density*, 2019, Meeting of the Canadian Astronomical Society, Montreal, Canada.
- *Insights into cluster relaxation and galaxy quenching from X-ray obs. (at low-z)*, 2018, GOGREEN collaboration meeting, Waterloo, Canada.
- *Connecting optical and X-ray tracers of galaxy cluster relaxation*, 2018, Glenfiddling Galaxy Clusters workshop, Edinburgh, Scotland.
- *A product of their Halo Environment: How galaxy properties depend on group X-ray luminosity and dynamical state*, 2016, Annual Meeting of the Canadian Astronomical Society, Winnipeg, Canada.
- *Implications for meteoroid structure and ablation from multiple maxima meteor light curves*, 2013, International Meteor Conference, Poznan, Poland.

Contributed Posters

- *CLIFS: The Coma Legacy IFU Survey*, 2024, Meeting of the Canadian Astronomical Society, Toronto, Canada.
- *LOFAR Jellyfish Galaxies in Nearby Groups*, 2021, Meeting of the European Astronomical Society, Leiden, Netherlands.
- *LoTSS of Jellyfish Galaxies in Nearby Groups and Clusters*, 2021, Meeting of the Canadian Astronomical Society, Penticton BC, Canada.
- *Quenching low-mass satellite galaxies: evidence for a threshold ICM density*, 2018, Meeting of the Canadian Astronomical Society, Victoria, Canada.

- *The dependence of galaxy properties on group X-ray luminosity and dynamics*, 2017, Galaxy Evolution Across Time, Paris, France.
- *How galaxy properties depend on group X-ray luminosity and dynamical state*, 2016, CAASTRO: The Changing Face of Galaxies, Hobart, Tasmania AUS.
- *How galaxy properties depend on group X-ray luminosity and dynamical state*, 2016, Great Lakes Cosmology Workshop, Hamilton, Canada.
- *Effects of X-ray luminosity on galaxy star formation and morphology in SDSS groups and clusters*, 2015, Meeting of the Canadian Astronomical Society, Hamilton, Canada.
- *Mass-segregation trends in SDSS galaxy groups*, 2015, Meeting of the Canadian Astronomical Society, Hamilton, Canada.
- *Laser Ablation Techniques for Simulation of Hypervelocity Impact on Materials Relevant to the Space Industry*, 2012, IRM 10th Anniversary Symposium, The Future of Materials Research, Halifax, Canada.