

Samantha Benincasa

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Education

PhD in Physics

SUPERVISORS: JAMES WADSLEY & HUGH COUCHMAN

STAR FORMATION IN THE GALACTIC CONTEXT: A QUANTITATIVE APPROACH

McMaster University
Sept. 2014 - Sept. 1 2018

MSc in Physics

SUPERVISORS: JAMES WADSLEY & HUGH COUCHMAN

ON THE RELATIONSHIP BETWEEN STAR FORMATION AND THE ISM IN NUMERICAL SIMULATIONS

McMaster University
Sept. 2012 - Aug. 2014

BSc in Physics

THESIS SUPERVISOR: RALPH PUDRITZ

SIMULATING THE FORMATION OF GIANT MOLECULAR CLOUDS

McMaster University
Sept. 2008 - Apr. 2012

Professional Experience

CCAPP Fellow, NSERC Fellow & President's Postdoctoral Scholar

the Ohio State University
Sept. 2020 - present

Postdoctoral Researcher

SUPERVISOR: ANDREW WETZEL

University of California, Davis
Oct. 2018 - Sept. 2020

Graduate Research Assitant

SUPERVISORS: JAMES WADSLEY & HUGH COUCHMAN

McMaster University
Sept. 2012 - Sept. 2018

Honors & Awards

2021-now	Ohio State President's Postdoctoral Scholar
2020-now	NSERC Postdoctoral Fellowship
2020-now	CCAPP Fellowship
2015-2018	Vanier Canada Graduate Scholarship
2015-2018	NSERC PGS-D (declined)
2014-2015	Dalley Fellowship
2013-2014	Desmond G. Burns Graduate Scholarship
2013-2014	McMaster University Graduate Entrance Scholarship

Grants Awarded

2021	Co-I (PI Sarah Loebman) , HST Theory Program (Cycle 29) Simulating clustered star formation in a cosmological galactic context
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Supercomputing Awarded

2021	PI XSEDE Bridges2 – 500,000 core-hours: Simulating BESPOKE Galaxies
2019	Co-PI XSEDE Stampede 2 – 1.4 M core-hours: Simulating the Milky Way with the LMC
2017	Co-PI Compute Canada Niagara – 5.6 M core-hours: Ecology of Galaxies
2016	Co-PI Compute Canada Scinet GPC – 4 M core-hours: Molecular Cloud Formation
2015	Co-PI Compute Canada Scinet GPC – 4.3 M core-hours: Molecular Cloud Formation

Telescope Time Awarded

2021	Co-I (PI Jonathan Henshaw) , ALMA (cycle 8) – 22.7 H (12 M) Beads-on-a-string: The formation and evolution of GMCs in NGC4321
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Science Collaborations

- 2018-now Pls: **Benincasa & Pettitt, BESPOKE Galaxies**
2020-now Pls: Schinnerer, Leroy, Blanc, Emsellem & Rosolowsky, **PHANGS**
2018-now Pl: Hopkins, **FIRE**
2012-now Pls: Quinn & Wadsley, **N-body Shop**
2013-2018 Pls: Kim & Primack, **AGORA Galaxy Comparison Project**

Presentations

SEMINARS & INVITED TALKS

- 2021 **Sacramento State University** Seminar Talk
2021 **Ringberg Galaxy Evolution Workshop** Invited Talk
2021 **N-body Shop Excellence Conference** Keynote Talk
2020 **Ohio State University** CCAPP Seminar
2019 **University of Alberta** Seminar Talk
2019 **Space Telescope Science Institute** Galaxies Lunch Talk
2019 **American Museum of Natural History** Seminar Talk
2019 **Rutgers University** Seminar Talk
2019 **Ohio State University** CCAP Seminar Talk
2019 **University of California, Davis** Seminar Talk
2017 **University of Victoria** Seminar Talk
2017 **University of Washington** Seminar Talk
2012 **Tokyo Kavli IPMU** Seminar Talk
2012 **University of Hokkaido** Seminar Talk

CONTRIBUTED TALKS

- 2021 **CCAPP Symposium** BESPOKE Galaxy Samples: A tailor-made approach to simulations
2021 **CASCA AGM (Virtual)** BESPOKE Galaxy Samples: A new way to study the ISM
2021 **ISM 2021: Structure, characteristic scales and star formation** BESPOKE Galaxies
2019 **Santa Cruz Galaxy Workshop** Connecting GMCs and Star Clusters in Simulations
2019 **CASCA AGM (McGill University)** The Life and Death of Stellar Nurseries
2019 **Linking the Milky Way and Nearby Galaxies** Life and Death of Stellar Nurseries
2017 **Santa Cruz Galaxy Workshop** A Tale of Two Clump Masses
2016 **Great Lakes Galaxy Workshop** Pressure-driven regulation in galaxies
2016 **Ringberg Computational Galaxy Formation** Pressure-driven regulation in galaxies
2015 **Santa Cruz Galaxy Workshop** The anatomy of a spiral galaxy
2015 **CASCA AGM (McMaster University)** The anatomy of a spiral galaxy
2013 **CASCA AGM (Laval University)** Regulating star formation in spiral galaxies

Professional Service & Outreach

- 2021 **Undergrad Seminar Physics 2095** the Ohio State University
2021 **Undergrad Seminar Astronomy 2895 Survey Course** the Ohio State University
2021 - now **CCAPP Seminar Organizer** the Ohio State University
2021 **Panel Review Member** NASA ATP
2021 **Committee Member** CCAPP Code of Conduct Revision
2020-2021 **Team Member** OSU Astronomy Department AIP Team Up Implementation
2020 **Committee Member** N-body Shop Code of Conduct Development
2020 **Panel Review Member** NSF
2018-2020 **Committee Member** UC Davis Diversity in Physics
2019 **Speaker - CCUWiP** UC Davis
2018 - 2020 **Cosmology Seminar Organizer** UC Davis
2017 **Guest Expert/Mentor** Canadian Association for Girls in Science
2017 **Panel Member** Women In Science Panel, St. Thomas More High School

2016-2018 **President** Graduate Women in Physics & Astronomy
 2013-2018 **Co-ordinator** McMaster Astrophysics Journal Club
 2015-2018 **Organizer & Volunteer** Girls in Science Day
 2016 **LOC Member** Great Lakes Galaxy Workshop
 2015-2016 **Chair** Liaison Committee, McMaster Department of Physics & Astronomy
 2014-2016 **Executive Committee Member** Graduate Women in Physics & Astronomy
 2013-2015 **Volunteer** Let's Talk Science
 2012-2015 **Lab Demonstrator** Physical Sciences@Mac High School Engagement Program
 2012-2015 **Planetarium Presenter** William J. McCallion Planetarium
 2014 **LOC Member** CASCA Graduate Student Workshop
 2013-2014 **3D Theatre Presenter** McMaster Origins Institute 3D Theatre
 2013 **Graduate Student Representative** CUPC Graduate School Recruitment Fair
 2013 **Adjudicator** Canadian Undergraduate Physics Conference (CUPC)

Mentoring Experience

Logan Steele - Ohio State SURP summer research 2021

Teaching Experience

Head Teaching Assistant

responsible for organizing TAs

- Astro 2B03 - The Big Questions
- Astro 1F03 - Introduction to Astronomy

McMaster University

2015 - present

Teaching Assistant

variety of duties including marking, running tutorials, running labs, etc...

- Astro 2B03 - The Big Questions
- Astro 1F03 - Introduction to Astronomy
- Astro 2E03 - Planetary Astronomy
- Astro 3X03 - Galaxies & Cosmology
- Astro 3Y03 - Stellar Structure
- Physics 2E03 - Classical Mechanics
- Physics 1B03 - Introduction to Waves and Mechanics
- Physics 1BA3 - Introduction to Modern Physics
- Physics Help Center

McMaster University

2012 - present

Tutorial Leader

GUEST EXPERT

- ISci 3H03 - Light, the Universe and Everything

McMaster University

2014 - 2016

List of Publications

FIRST AUTHOR PUBLICATIONS (5 TOTAL)

1. **Benincasa, S. M.**; Wadsley, J. W.; Couchman, H. M. P.; Pettit, A. R.; Keller, B. W.; Woods, R. M.; Grond, J. The Anatomy of a Star-forming Galaxy II: The impact of FUV heating. *MNRAS*, 2020, 499, 2028
2. **Benincasa, Samantha M.**; Loebman, Sarah R.; Wetzel, Andrew; Hopkins, Philip F.; Murray, Norman; Bellardini, Matthew A.; Faucher-Giguère, Claude-André; Guszejnov, Dávid; Orr, Matthew. Live Fast, Die Young: GMC lifetimes in the FIRE cosmological simulations of Milky Way-mass galaxies. *MNRAS*, 2020, 497, 3993
3. **Benincasa, S. M.**; Wadsley, J.; Couchman, H. M. P.; Pettitt, A. R.; Tasker, E. J. A tale of two clump masses: a new approach to studying stellar clump formation in simulations. *MNRAS*, 2019, 486, 502
4. **Benincasa, S. M.**; Wadsley, J.; Couchman, H. M. P.; Keller, B. W. The anatomy of a star-forming galaxy: pressure-driven regulation of star formation in simulated galaxies. *MNRAS*, 2016, 462, 3053
5. **Benincasa, Samantha M.**; Tasker, Elizabeth J.; Pudritz, Ralph E.; Wadsley, James. Giant Molecular Cloud Formation in Disk Galaxies: Characterizing Simulated versus Observed Cloud Catalogs. *ApJ*, 2013, 776, 23

PUBLICATIONS WITH SIGNIFICANT CONTRIBUTIONS (2 TOTAL)

6. Ward, Rachel L.; **Benincasa, Samantha M.**; Wadsley, James; Sills, Alison; Couchman, H. M. P. The properties of bound and unbound molecular cloud populations formed in galactic disc simulations. *MNRAS*, 2016, 455, 920
7. Keller, B. W.; Wadsley, J.; **Benincasa, S. M.**; Couchman, H. M. P. A superbubble feedback model for galaxy simulations. *MNRAS*, 2014, 442, 3013

CONTRIBUTING AUTHOR PUBLICATIONS (9 TOTAL)

8. Leroy, Adam K.; Schinnerer, Eva; Hughes, Annie; Rosolowsky, Erik; Pety, Jérôme; Schrubba, Andreas; Usero, Antonio; Blanc, Guillermo A.; Chevance, Mélanie; Emsellem, Eric; Faesi, Christopher M.; Herrera, Cinthya N.; Liu, Daizhong; Meidt, Sharon E.; Querejeta, Miguel; Saito, Toshiki; Sandstrom, Karin M.; Sun, Jiayi; Williams, Thomas G.; Anand, Gagandeep S.; Barnes, Ashley T. Behrens, Erica A.; Belfiore, Francesco; **Benincasa, Samantha M.**; Bešlić, Ivana; Bigiel, Frank; Bolatto, Alberto D.; den Brok, Jakob S.; Cao, Yixian; Chandar, Rupali; Chastenet, Jérémy; Chiang, I-Da; Congiu, Enrico; Dale, Daniel A.; Deger, Sinan; Eibensteiner, Cosima; Egorov, Oleg V.; García-Rodríguez, Axel; Glover, Simon C. O.; Grasha, Kathryn; Henshaw, Jonathan D.; Ho, I-Ting; Kepley, Amanda A.; Kim, Jaeyeon; Klessen, Ralf S.; Kreckel, Kathryn; Koch, Eric W.; Kruijssen, J. M. Diederik; Larson, Kirsten L.; Lee, Janice C.; Lopez, Laura A.; Machado, Josh; Mayker, Ness; McElroy, Rebecca; Murphy, Eric J.; Ostriker, Eve C.; Pan, Hsi-An; Pessa, Ismael; Puschnig, Johannes; Razza, Alessandro; Sánchez-Blázquez, Patricia; Santoro, Francesco; Sardone, Amy; Scheuermann, Fabian; Sliwa, Kazimierz; Sormani, Mattia C.; Stuber, Sophia K.; Thilker, David A.; Turner, Jordan A.; Utomo, Dyas; Watkins, Elizabeth J.; Whitmore, Bradley. PHANGS-ALMA: Arcsecond CO(2-1) Imaging of Nearby Star-Forming Galaxies. arXiv:2104.07739
9. Orr, Matthew E.; Hatchfield, H. Perry; Battersby, Cara; Hayward, Christopher C.; Hopkins, Philip F.; Wetzel, Andrew; **Benincasa, Samantha M.**; Loebman, Sarah R.; Sormani, Mattia C.; Klessen, Ralf S. Cores: Bursty and Smooth Star Formation Distributions across Galaxy Centers in Cosmological Zoom-in Simulations. arXiv:2101.11034
10. Santistevan, Isaiah B.; Wetzel, Andrew; El-Badry, Kareem; Bland-Hawthorn, Joss; Boylan-Kolchin, Michael; Bailin, Jeremy; Faucher-Gigère, Claude-André; **Benincasa, Samantha**. Growing Pains: The Formation Times and Building Blocks of Milky Way-mass Galaxies in the FIRE Simulations. *MNRAS*, 2020, 497, 747
11. Keating, Laura C.; Richings, Alexander J.; Murray, Norman; Faucher-Gigère, Claude-André; Hopkins, Phillip F.; Wetzel, Andrew; Kereš, Dušan; **Benincasa, Samantha**; Feldmann, Robert; Sarah Loebman, Sarah; Orr, Matthew E. Reproducing the CO-to-H₂ conversion factor in cosmological simulations of Milky Way-mass galaxies. *MNRAS*, 2020, 499, 837
12. Guszejnov, David; Grudić, Michael Y.; Offner, Stella S. R.; Boylan-Kolchin, Michael; Faucher-Gigère, Claude-André; Wetzel, Andrew; **Benincasa, Samantha M.**; Loebman, Sarah Evolution of giant molecular clouds across cosmic time. *MNRAS*, 2020, 492, 488
13. Samuel, Jenna; Wetzel, Andrew; Tollerud, Erik; Garrison-Kimmel, Shea; Loebman, Sarah; El-Badry, Kareem; Hopkins, Philip F.; Boylan-Kolchin, Michael; Faucher-Giguere, Claude-Andre; Bullock, James S.; **Benincasa, Samantha**; Bailin, Jeremy A profile in FIRE: resolving the radial distributions of satellite galaxies in the Local Group with simulations. *MNRAS*, 2020, 491, 1471
14. Pettitt, Alex R.; Tasker, Elizabeth J.; Wadsley, James W.; Keller, Ben W.; **Benincasa, Samantha M.** Star formation and ISM morphology in tidally induced spiral structures. *MNRAS*, 2017, 468, 4189
15. Kim, Ji-hoon; Agertz, Oscar; Teyssier, Romain; Butler, Michael J.; Ceverino, Daniel; Choi, Jun-Hwan; Feldmann, Robert; Keller, Ben W.; Lupi, Alessandro; Quinn, Thomas; Revaz, Yves; Wallace, Spencer; Gnedin, Nickolay Y.; Leitner, Samuel N.; Shen, Sijing; Smith, Britton D.; Thompson, Robert; Turk, Matthew J.; Abel, Tom; Arraki, Kenza S.; **Benincasa, Samantha M.**; Chakrabarti, Sukanya; DeGraf, Colin; Dekel, Avishai; Goldbaum, Nathan J.; Hopkins, Philip F.; Hummels, Cameron B.; Klypin, Anatoly; Li, Hui; Madau, Piero; Mandelker, Nir; Mayer, Lucio; Nagamine, Kentaro; Nickerson, Sarah; O'Shea, Brian W.; Primack, Joel R.; Roca-Fàbrega, Santi; Semenov, Vadim; Shimizu, Ikkoh; Simpson, Christine M.; Todoroki, Keita; Wadsley, James W.; Wise, John H.; AGORA Collaboration. The AGORA High-resolution Galaxy Simulations Comparison Project. II. Isolated Disk Test. *ApJ*, 2016, 462, 3053
16. Pan, Hsi-An; Fujimoto, Yusuke; Tasker, Elizabeth J.; Rosolowsky, Erik; Colombo, Dario; **Benincasa, Samantha M.**; Wadsley, James. Effects of galactic disc inclination and resolution on observed GMC properties and Larson's scaling relations. *MNRAS*, 2016, 458, 2443

17. Pan, Hsi-An; Fujimoto, Yusuke; Tasker, Elizabeth J.; Rosolowsky, Erik; Colombo, Dario; **Benincasa, Samantha M.**; Wadsley, James. What is a GMC? Are observers and simulators discussing the same star-forming clouds? MNRAS, 2015, 453, 3082

WHITE PAPERS

18. Eadie, Gwendolyn; Bahramian, Arash; Barmby, Pauline; Craiu, Radu; Bingham, Derek; Hložek, Renée; Kavelaars, JJ; Stenning, David; **Benincasa, Samantha**; Thomas, Guillaume; Thanjavur, Karun; Bovy, Jo; Cami, Jan; Carlberg, Ray; Lawler, Sam; Liu, Adrian; Ngo, Henry; Rahman, Mubdi; Rupen, Michael. LRP2020: Astrostatistics in Canada. White paper E017 submitted to the Canadian Long Range Plan LRP2020