MOLLY JEAN GALLAGHER
CURRICULUM VITAE

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Research Interests

Characterization of the self-regulating relationship between star formation, galactic environment, and molecular gas; use of millimeter-wave spectroscopy to measure gas properties; exploration of using high-critical density molecular emission lines to detect dense gas.

Education

The Ohio State University
Ph.D., Astronomy — expected 2019
Adviser: Adam Leroy
Thesis: Environmental Dependence of Dense Gas and its Relationship to Star Formation
M.S., Astronomy — 2017

Grinnell College
B.A. Physics — 2014
Honors in Physics
H. George Apostle Prize, Grinnell College — 2014

Research Experience

- Expert in Python and IDL.
- Attended Synthesis Imaging School 2016
- Observing experience on the Green Bank Telescope and the IRAM-30m telescope

Teaching and Outreach Experience

- Interviews with OSU College of Arts and Science news team about the Green Bank Telescope and the Big Ear. 2018
- Experience assisting with OSU Supercomputing Center's Summer Institute. 2018
- Experience acting as an expert guide to the Ohio State University Astronomy Club on a trip to the Green Bank Telescope. 2018
- Experience giving several different shows at the Arne Slettebak Planetarium. 2014–present
- Varied outreach experience including 4-H Science Day, Baily's Mini Course Night, and the Summer Library Series. 2014–present
- Astronomy presentations to several local middle school classes, the Ohio State University Astronomy Club, and the community. 2014–present
- Astronomy Laboratory Instructor, The Ohio State University 2014–2015
- Graduate Teaching Associate, The Ohio State University 2014
- Member, Physics SEPC 2012-2014
- Physics Mentor, Grinnell College (General Physics I, General Physics, II, Modern Physics, Mechanics) 2012–2014
- Floor Interpreter and Tour Guide, Adler Planetarium 2010

First-Author Publications

1. *"Dense Gas, Dynamical Equilibrium Pressure, and Star Formation in Nearby Star-forming Galaxies,"* **Gallagher, M. J.**, et al., 2018a, ApJ, 858, 90
2. *"Do Spectroscopic Dense Gas Fractions Track Molecular Cloud Surface Densities?,"* **Gallagher, M. J.**, et al. 2018b, ApJL, 868, 38

Other Refereed Publications

1. *"Dense Molecular Gas in the Nearby Low-metallicity Dwarf Starburst Galaxy IC 10,"* Kepley, A.,*et al.*, 2018, ApJ, 862, 120
2. *"Full-disc ^{13}CO (1-0) mapping across nearby galaxies of the EMPIRE survey and the CO-to-H_2 conversion factor,"* Cormier, D.,*et al.*, 2018, MNRAS, 475, 3909
3. *"Cloud-scale ISM Structure and Star Formation in M51,"* Leroy, A. K., *et al.*, 2017, ApJ, 846, 71
4. *"Optical depth estimates and effective critical densities of dense gas tracers in the inner parts of nearby galaxy discs,"* Jiménez-Donaire, M. J., *et al.*, 2017, MNRAS, 466, 49
5. *"$^{13}CO/C^{18}O$ Gradients across the Disks of Nearby Spiral Galaxies,"* Jiménez-Donaire, M. J., *et al.*, 2017, ApJ, 836L, 29
6. *"Millimeter-wave Line Ratios and Sub-beam Volume Density Distributions,"* Leroy, A. K., *et al.*, 2017, ApJ, 835, 217

Contributed Talks

1. *"Dense Gas, Interstellar Pressure, and Star Formation in Four Nearby Star-Forming Galaxies,"* Multi-Scale Star Formation, Morelia, Mexico, April 2017
2. *"New ALMA Dense Gas Maps: Gas Density, Interstellar Pressure, and Star Formation in Nearby Star-Forming Galaxies,"* The Role of Gas in Galaxy Dynamic, Valletta, Malta, October 2017
3. *"Extragalactic Dense Gas: Comparisons to Cloud-Scale ALMA CO,"* The Green Bank Telescope Surveys Workshop, Green Bank, WV, November 2018
4. *"Mapping Extragalactic Dense Molecular Gas: Ties to Environment and Star Formation,"* AAS Winter Meeting, Seattle, WA, January 2019

Posters

1. *"The Incidence of Debris Disks Around M Dwarfs Within 25pc,"* AAS Winter Conference,Washington, DC, January 2014
2. *"Effects of Extended Ultraviolet Disks on Galaxy Structure,"* AAS Winter Conference, Long Beach, CA, January 2013
3. *"Fourier Analysis of Variable Star Light Curves,"* Student Research Symposium Poster Session, Grinnell, IA, April 2012

Major Proposals

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1. P-I: *"A Wide, Deep Dense Gas Map of M100 to Connect Extragalactic and Galactic Dense Gas Results,"* ALMA, 84.4 hours awarded, July 2017

2. Co-I: *"Can we trust 'dense gas tracers' to trace dense gas?,"* ALMA, May 2018

3. Co-I: *"An ACA Survey of Dense Gas Across, the Nearest, Brightest Southern Galaxy Disks,"* ALMA, May 2018

4. Co-I: *"Probing the Excitation and the Mass-Luminosity Conversion Factor of the Dense, Star Forming Gas Across Galaxy Disks,"* ALMA, May 2018

5. Co-I: *"Deriving dense gas optical depth and carbon abundance for the first time in a normal disk galaxy: NGC 6946,"* IRAM 30m, May 2017

6. Co-I: *'The mass-luminosity conversion factor of dense gas tracers and the star-formation laws in galaxy disks,"* IRAM 30m, May 2017

7. Co-I: *'Extragalactic GBT+ARGUS Gas Density Survey,"* Green Bank Telescope, August 2016

8. Co-I: *'A Deep Search for HI Signatures of the Circumgalactic Medium,"* Green Bank Telescope, February 2015