

# Ashley R. Bemis, Ph.D

CONTACT INFORMATION	bemisa@mcmaster.ca Dept. of Physics & Astronomy ABB-241, McMaster University, 1280 Main St W Hamilton ON, L8S 4M1	
EDUCATION	<b>MCMASTER UNIVERSITY</b> , Hamilton, ON, Canada Ph.D., Astrophysics, 2020 Thesis: <i>Dense Gas and Star Formation in Nearby Galaxies</i> Supervisor: Christine Wilson  <b>BONN UNIVERSITY &amp; MAX PLANCK INSTITÜT FÜR RADIOASTRONOMIE</b> , Bonn, Germany M.Sc., Astrophysics, 2013 Thesis: <i>Methanol as a Probe of Physical Conditions in Star Forming Regions</i> Supervisor: Karl Menten, Co-supervisor: Friedrich Wyrowski  <b>UNIVERSITY OF MASSACHUSETTS, AMHERST</b> , Amherst, MA, USA B.Sc. with Honors, Physics & Astronomy, 2011 Thesis: <i>The Role of Convergent Gas Streams in Producing Star Formation</i> Supervisor: Mark Heyer, Co-supervisor: Gopal Narayanan	
TEACHING EXPERIENCE	<b>MCMASTER UNIVERSITY</b> Guest Lecturer, <i>Physics 2MN3: Media Numeracy</i> 2019 Teaching Assistant, <i>Physics 2MN3: Media Numeracy</i> 2019 Teaching Assistant, <i>ArtSci 2D06: Physics</i> 2015 - 2019 Teaching Assistant, <i>Astron 2B03: Big Questions</i> 2015 - 2018 Teaching Assistant, <i>Physics 1A03: Introductory Physics</i> 2017 - 2018 Teaching Assistant, <i>Physics 1AA3: Introduction to Modern Physics</i> 2016 <b>GUIDED DISCOVERIES</b> Science Instructor, <i>AstroCamp</i> , Idyllwild, CA, USA 2014 <b>UNIVERSITY OF MASSACHUSETTS, AMHERST</b> Teaching Assistant, <i>Astron 103: Observational Astronomy</i> 2010 Tutor, <i>Astronomy Help Desk</i> 2009	
OUTREACH	<b>MCMASTER UNIVERSITY</b> Presenter, <i>William J McCallion Planetarium</i> 2015 - 2020 Member, <i>McMaster Sidewalk Astronomy</i> 2015 - 2020 Member, <i>Promoting Inclusivity in Physics &amp; Astronomy</i> <sup>1</sup> 2015 - 2020 Visiting Speaker Liason, <i>Promoting Inclusivity in Physics &amp; Astronomy</i> 2018 - 2020 Volunteer, <i>Girls in Science Day, McMaster University</i> 2015 - 2019 <b>ARGELANDER INSTITUTE FOR ASTRONOMY</b> Outreach Student Assistant, <i>SFB 956</i> 2012 <b>UNIVERSITY OF MASSACHUSETTS, AMHERST</b> President, <i>Five College Astronomy Club</i> 2010 - 2011 Member, <i>Five College Astronomy Club</i> 2008 - 2011 Presenter, <i>Orchard Hill Observatory</i> 2009 - 2011	

---

<sup>1</sup>Formerly *Graduate Women in Physics & Astronomy*

SCHOLARSHIPS,  
AWARDS, AND  
HONORS

**MCMMASTER UNIVERSITY**

Ontario Trillium Scholarship - Doctoral, \$160,000 (4 yr) 2015 - 2019  
Best Poster, The Laws of Star Formation Conference, Cambridge, UK 2018

**BONN UNIVERSITY**

Bonn International Graduate School Scholarship, €1,200 2011 - 2012

**UNIVERSITY OF MASSACHUSETTS, AMHERST**

Commencement Speaker, College of Natural Sciences, Astronomy Dept. 2011  
William F. Field Alumni Scholarship, \$750 2010  
Incentive Award, \$20,000 (4 yr) 2007 - 2011  
Member of Commonwealth College, Honors College 2007 - 2011

SUCCESSFUL  
OBSERVING  
PROGRAMS

**PI, Bemis A. R.**, Wilson C. D., *The Submillimeter Array*, 2018B-S022,  
“INVESTIGATING DENSE GAS AND STAR FORMATION IN THE ANTENNAE” 2018B

**PI, Bemis A. R.**, Wilson C. D., *James Clerk Maxwell Telescope*, HARP, M18AP063,  
4 hours “CONSTRAINING THE RELATIONSHIP BETWEEN HCN(4-3) LUMINOSITY AND  
DENSE GAS MASS BY MAPPING CLUMPS AND CORES IN GALACTIC GMCs” 2018A

**PI, Bemis A. R.**, Wilson C. D., Rosolowsky E., Kirk H., *James Clerk Maxwell  
Telescope*, RxA3m, M18AP061 “MULTI-LINE ANALYSIS OF DENSE GAS IN CYGNUS X” 2018A

**PI, Bemis A. R.**, Wilson C. D., *James Clerk Maxwell Telescope*, RxA3m, M17BP036,  
51.5 hours: “MULTI-LINE ANALYSIS OF DENSE GAS IN AQUILA.” 2017B

**PI, Bemis A. R.**, Wilson C. D., Rosolowsky E., Kirk H., Gao Y., Jiang X.-J., *James  
Clerk Maxwell Telescope*, HARP, M17AP070, 36 hours. : “CONSTRAINING THE  
RELATIONSHIP BETWEEN HCN(4-3) LUMINOSITY AND DENSE GAS MASS BY  
MAPPING CLUMPS AND CORES IN THE AQUILA RIFT AND CYGNUS X REGIONS.” 2017A

**PI, Bemis A. R.**, Wilson C. D., Rosolowsky E., Nguyen-Luong Q., Gao Y., Jiang  
X.-J., *James Clerk Maxwell Telescope*, HARP,, M16BP010, 75 hours: “CONSTRAINING  
THE RELATIONSHIP BETWEEN HCN(4-3) LUMINOSITY AND DENSE GAS MASS BY  
MAPPING CORES IN THE AQUILA RIFT.” 2016B

REFEREED  
PUBLICATIONS

5. Wilson, C.D., Elmegreen, B. G., **Bemis, A. R.**, Brunetti, N., 2019, *The Kennicutt -  
Schmidt Law and Gas Scale Height in Luminous and Ultraluminous Infrared Galaxies*,  
201, ApJ, 882, 5

4. Finn, M.K., Johnson, K.E., Brogan, C.L., Wilson, C.D., Indebetouw, R., Harris,  
W.E., Kamenetzky, J., **Bemis, A.R.**, 2019, *New Insights into the Physical Conditions  
and Internal Structure of a Candidate Proto - globular Cluster*, ApJ, 874, 120

3. **Bemis, A.R.**, Wilson, C.D., 2019 *Kiloparsec-Scale Variations in the Star Formation  
Efficiency of Dense Gas: The Antennae Galaxies (NGC 4038/39)*, AJ, 157, 131

2. Tan, Q.-H., Gao, Y., Zhang, Z.-Y., Greve, T.R., Jiang, X.-J., Wilson, C.D., Yang,  
C.-T., **Bemis, A.R.**, Chung, A., Matsushita, S. et al., 2018, *The MALATANG Survey:  
The  $L_{GAS} - L_{IR}$  Correlation on Sub-kiloparsec Scale in Six Nearby Star-forming  
Galaxies as Traced by HCN  $J = 4 \rightarrow 3$  and HCO<sup>+</sup>  $J = 4 \rightarrow 3$* , ApJ, 860, 165

1. Narayanan, G., Snell, R., **Bemis, A.R.**, 2012, *Molecular outflows identified in the  
FCRAO CO survey of the Taurus Molecular Cloud*, MNRAS, 425, 2641

PUBLICATIONS IN PREPARATION	5. THESIS CHAPTER III, SUBMISSION POST-DEFENCE: <b>Bemis, A.R.</b> , Wilson, C.D., 2020. <i>Does the HCN/CO Ratio Track the Dense Gas Fraction? I. A comparison to analytical models of star formation.</i>	
	4. THESIS CHAPTER IV, SUBMISSION POST-DEFENCE: <b>Bemis, A.R.</b> , Wilson, C.D., 2020. <i>Does the HCN/CO Ratio Track the Dense Gas Fraction? I. A radiative transfer perspective.</i>	
	3. <b>Bemis, A.R.</b> , Wilson, C.D., 2020, in prep. <i>Variations in HCN, HCO<sup>+</sup>, and CO emission at sub-kpc scales in nearby galaxies.</i>	
	2. <b>Bemis, A.R.</b> , Wilson, C.D., 2020, in prep. <i>Constraining the <math>L_{\text{HCN}} - M_{\text{Dense}}</math> Relationship using Galactic Sources</i>	
	1. Wilson, C. D., <b>Bemis, A.R.</b> , & Klimi, O., 2020, in prep., <i>A strong correlation of CN and HCN in galaxies: a new tracer of dense gas</i>	
CONTRIBUTED TALKS	4. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Star Formation and Dense Gas in Extreme Environments with ALMA.</i> Views on the Interstellar Medium in Galaxies in the ALMA Era, Bologna, Italy	2019
	3. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Investigating Dense Gas and Star Formation in the Antennae Galaxies (NGC 4038/39) using ALMA.</i> Star Formation in Different Environments: From Local Clouds to Distant Galaxies, ICISE, Quy Nhon, Vietnam	2017
	2. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Investigating Dense Gas and Star Formation in the Antennae Galaxies (NGC 4038/39) using ALMA.</i> Canadian Astronomical Society Annual General Meeting, Winnipeg, MB, Canada	2016
	1. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Investigating Dense Gas and Star Formation in the Antennae Galaxies (NGC 4038/39) using ALMA.</i> Great Lakes Cosmology Workshop, Hamilton, ON, Canada	2016
INVITED TALKS	<b>Bemis, A.R.</b> , Wilson, C.D., <i>Connecting Observations of Molecular Line Ratios to Theories of Star Formation</i> , AAS 236, Virtual Meeting	2020
SEMINARS	1. <b>Bemis, A.R.</b> , Wilson, C.D. <i>Investigating Dense Gas and Star Formation at Different Scales: from Milky Way Molecular Clouds to the GMCs of the Antennae Galaxies (NGC 4038/39).</i> , Seminar, East Asian Observatory, Hilo, HI, USA	2017
CONFERENCE POSTERS	4. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Star Formation and Dense Gas in Extreme Environments with ALMA.</i> The Laws of Star Formation Conference, Cambridge, UK	2018
	3. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Investigating Dense Gas and Star Formation in the Antennae Galaxies (NGC 4038/39) using ALMA.</i> Molecular Gas in Galaxies Workshop, Charlottesville, VA	2016
	2. <b>Bemis, A.R.</b> , Wilson, C.D., Schirm, M. <i>Investigating Dense Gas and Star Formation in the Antennae Galaxies (NGC 4038/39) using ALMA.</i> Half a Decade of ALMA Conference, Palm Springs, CA	2016
	1. <b>Bemis, A.R.</b> , Leroy, A., Friesen, R. <i>The Effect of Environment on Star Formation in Giant Molecular Clouds in NGC 2403</i> 217th Meeting of the American Astronomical Society, Seattle, WA	2011
OBSERVING EXPERIENCE	JCMT: Mapping the Dense Molecular Gas in the Strongest Star-forming Galaxies (MALATANG) JCMT Large Program.	Winter 2015
	JCMT: PI Project M17AP070	Summer 2017
	JCMT, PI Project M17BP036	Fall 2017
	JCMT: PI Project M18AP061	Spring 2018
RELEVANT WORK	<b>Scientific Data Analyst I</b> , North American ALMA Science Center, National Radio Astronomy Observatory, Charlottesville, VA	2015