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EDUCATION

- 2015 Ph.D. Physical Chemistry, California Institute of Technology
- 2011 M.S. Physical Chemistry, Emory University
- 2009 B.S. Chemistry (*Highest Distinction*), University of Illinois at Urbana-Champaign
- 2005 Charleston High School (*Valedictorian*), Charleston, IL

EMPLOYMENT AND RESEARCH EXPERIENCE

- Massachusetts Institute of Technology, Department of Chemistry**
 - 2024 – *Assistant Professor*
 - 2021 – 2024 *Class of 1943 Career Development Assistant Professor*
 - 2020 – 2021 *Assistant Professor*

- National Radio Astronomy Observatory
Center for Astrophysics | Harvard & Smithsonian**
 - 2017 – 2020 *NASA Hubble Postdoctoral Fellow*
 - 2014 – 2017 *NRAO Jansky Postdoctoral Fellow*

- California Institute of Technology**
 - 2011 – 2014 *Graduate Research Assistant*
Advisor: Geoffrey A. Blake, Department of Chemistry

- Emory University**
 - 2009 – 2011 *Graduate Research Assistant*
Advisor: Susanna L. Widicus Weaver, Department of Chemistry

- University of Illinois at Urbana-Champaign**
 - 2006 – 2009 *Undergraduate Research Assistant*
Advisor: Benjamin J. McCall, Department of Chemistry

PROFESSIONAL APPOINTMENTS

- 2020 – Adjunct Assistant Astronomer, National Radio Astronomy Observatory
- 2018 – Research Associate, Center for Astrophysics | Harvard & Smithsonian
- 2017 – 2024 Research Assistant Professor, Department of Astronomy, University of Virginia
- 2018 Adjunct Research Assistant Professor, Department of Chemistry, University of Illinois
- 2015 – 2018 Visiting Scientist, Center for Astrophysics | Harvard & Smithsonian
- 2011 – 2014 NSF Graduate Research Program Fellow, California Institute of Technology
- 2011 Curriculum Development Fellow, Emory University
- 2009 – 2011 Robert W. Woodruff Fellow, Emory University

SELECTED HONORS AND AWARDS

- 2022 Helen B. Warner Prize for Astronomy from the American Astronomical Society
- 2022 MIT Award for Teaching with Digital Technology (Student-Nominated, Student-Judged)
- 2022 Flygare Award at the 75th International Symposium on Molecular Spectroscopy
- 2021 Beckman Young Investigator Award
- 2020 Chemical & Engineering News Talented 12 Award ([News Article](#))
- 2019 AAS Laboratory Astrophysics Division Early Career Award
- 2019 Science News Top 10 Scientists to Watch ([News Article](#))
- 2018 ACS Physical Chemistry Division Young Investigator Award
- 2018 List of Teachers Ranked as Excellent by Their Students, University of Illinois ([Student Evaluations](#))
- 2015 ACS Astrochemistry Award for Best Doctoral Dissertation
- 2014 Caltech Everhart Lectureship Award
- 2013 Rao Prize at the 68th International Symposium on Molecular Spectroscopy

PUBLICATIONS

[Google Scholar Profile](#) – [ORCID Profile](#)

Blue numbers are active links to full article PDFs (in most PDF viewers).

*Includes MIT Student

†Includes MIT Postdoc

Submitted Publications At MIT (1)

- [129]*† Shay, H., Scolati, H., Wenzel, G., Lee, K.L.K., Marimuthu, A., & McGuire, B.A., "Exploring effects of modified machine learning pipelines of astrochemical inventories," 2024, *Astrophysical Journal*, submitted.

Refereed Publications At MIT (72)

- [128]*† Byrne, A., Xue, C., Van Voorhis, T., & McGuire, B.A., "Sensitivity Analysis of Aromatic Chemistry to Gas-Phase Kinetics in a Dark Molecular Cloud Model," 2024, *Physical Chemistry Chemical Physics*, accepted.
- [127]*† Remijan, A.J., Fried, Z., Cooke, I.R., Wenzel, G., Loomis, R.A., Shingledecker, C.N., Lipnicky, A., Xue, C., McCarthy, M.C., & McGuire, B.A., "High spectral resolution observations of propynal (HCCCHO) towards TMC-1 from the GOTHAM Large Program on the Green Bank Telescope," 2024, *Astrophysical Journal*, accepted.
- [126] Bergner, J.B., Sturm, J.A., Piacentino, E.L., McClure, M.K., and 13 co-authors including McGuire, B.A., "JWST ice band profiles reveal mixed ice compositions in the HH 48 NE disk," 2024, *Astrophysical Journal*, accepted.
- [125] Alonso, E.R., Insausti, A., Kolesniková, L., León, I., and 9 co-authors including McGuire, B.A., "Synthesis and Spectroscopic Characterization of Interstellar Candidate Alkynyl Thiocyanate: HCCSCN," 2024, *Astrophysical Journal*, 976, 95.
- [124]*† Wenzel, G., Speak, T.H., Changala, P.B., Willis, R.H.J., Burkhardt, A.M., Zhang, S., Bergin, E.A., Byrne, A., Charnley, S.B., Fried, Z., Gupta, H., Herbst, E., Holdren, M.S., Lipnicky, A., Loomis, R.A., Shingledecker, C.N., Xue, C., Remijan, A.J., Wendlandt, A.E., McCarthy, M.C., Cooke, I.R., & McGuire, B.A., "Detections of interstellar 2-cyanopyrene and 4-cyanopyrene in TMC-1," 2024, *Nature Astronomy*, accepted.
- [123]*† Wenzel, G., Cooke, I.R., Changala, P.B., Bergin, E.A., Zhang, S., Burkhardt, A.M., Byrne, A., Charnley, S.B., Cordiner, M.A., Duffy, M., Fried, Z., Gupta, H., Holdren, M.S., Lipnicky, A., Loomis, R.A., Shay, H., Shingledecker, C.N., Siebert, M.A., Stewart, D.A., Willis, R.H.J., Xue, C., Remijan, A.J., Wendlandt, A.E., McCarthy, M.C., & McGuire, B.A., "Discovery of interstellar 1-cyanopyrene: A four-ring polycyclic aromatic hydrocarbon in TMC-1," 2024, *Science*, 386, 810.
- [122] Wright, M., McGuire, B.A., Ginsburg, A., Hirota, T., Bally, J., Hwangbo, R., Bhadra, T.D., John, C., & Dave, R., "Accretion and Outflow in Orion-KL Source I," 2024, *Astrophysical Journal*, 974, 150.
- [121]* Fried, Z., & McGuire, B.A., "Automated Mixture Analysis via Structural Evaluation (AMASE)," 2024, *Journal of Physical Chemistry A*, 128, 8254.
- [120] Sturm, J.A., McClure, M.K., Harsono, D., Bergner, J.B., and 16 co-authors including McGuire, B.A., "A JWST/MIRI analysis of the ice distribution and polycyclic aromatic hydrocarbon emission in the protoplanetary disk HH 48 NE," 2024, *Astronomy & Astrophysics*, 689, A92.
- [119] Shope, B.M., El-Abd, S., Brogan, C.L., Hunter, T.R., Willis, E.R., McGuire, B.A., & Garrod, R.T., "Interstellar Glycolaldehyde, Methyl Formate, and Acetic Acid. II. Chemical Modeling of the Bimodal Abundance Pattern in NGC 6334I," 2024, *Astrophysical Journal*, 972, 146.
- [118] Fortenberry, R., & McGuire, B.A., "A Possible Additional Formation Pathway for the Interstellar Diatomic SiS," 2024, *Astrophysical Journal*, 971, 101.
- [117] Noble, J.A., Fraser, H., Smith, Z.L., Dartois, E., and 30 co-authors including McGuire, B.A., "Detection of the elusive "dangling OH" ice features at 2.7 um in Cha I with JWST NIRCam," 2024, *Nature Astronomy*, 8, 1169.
- [116] van de Putte, D., Meshaka, R., Trahin, B., Habart, E., and 134 co-authors including McGuire, B.A., "PDRs4All VIII. Mid-IR emission line inventory of the Orion Bar," 2024, *Astronomy & Astrophysics*, 687, A86.

- [115] Dhariwal, A., Speak, T.H., Zeng, L., Rashidi, A., and 10 co-authors including McGuire, B.A., "On the origin of infrared bands attributed to tryptophan in Spitzer observations of IC 348," **2024**, *Astrophysical Journal Lett.*, 968, L9.
- [114]† Xue, C., Remijan, A.J., Faure, A., Momjian, E., Hunter, T.R., Loomis, R.A., Herbst, E., & McGuire, B.A., "Maser Activity of Organic Molecules toward Sgr B2(N)," **2024**, *Astrophysical Journal*, 967, 164.
- [113]* Nazari, P., Cheung, J.S.Y., Asensio, J.F., Murillo, N.M., and 13 co-authors including McGuire, B.A., "A Deep Search for Large Complex Organic Species Toward IRAS16239-2422 B at 3 mm with ALMA," **2024**, *Astronomy & Astrophysics*, 686, A59.
- [112] Peeters, E., Habart, E., Berné, O., Sidhu, A., and 134 co-authors including McGuire, B.A., "PDRs4All III: JWST's NIR spectroscopic view of the Orion Bar," **2024**, *Astronomy & Astrophysics*, 685, A74.
- [111] Habart, E., Peeters, E., Berné, O., Trahin, B., and 138 co-authors including McGuire, B.A., "PDRs4All II: JWST's NIR and MIR imaging view of the Orion Nebula," **2024**, *Astronomy & Astrophysics*, 685, A73.
- [110]*† Fried, Z., El-Abd, S., Hays, B.M., Wenzel, G., Byrne, A., Margulés, L., Motiyenko, R., Shipman, S.T., Horne, M.P., Jørgensen, J.K., Brogan, C.L., Hunter, T.R., Remijan, A.J., Lipnicky, A., Loomis, R.A., & McGuire, B.A., "Rotational Spectrum and First Interstellar Detection of 2-Methoxyethanol using ALMA Observations of NGC 6334I," **2024**, *Astrophysical Journal Lett.*, 965, L23.
- [109] Berné, O., Habart, E., Peeters, E., Schroetter, I., and 142 co-authors including McGuire, B.A., "Observations of the Far-Ultraviolet-driven photoevaporation flow from a protoplanetary disk," **2024**, *Science*, 383, 988.
- [108]† El-Abd, S., Brogan, C.L., Hunter, T.R., Lee, K.L.K., Loomis, R.A., & McGuire, B.A., "An Automated Chemical Exploration of NGC 6334I at 340 au Resolution," **2024**, *Astrophysical Journal*, 965, 14.
- [107] Dartois, E., Noble, J.A., Caselli, P., Fraser, H., and 21 co-authors including McGuire, B.A., "Spectroscopic Sizing of Interstellar Icy Grains with JWST," **2024**, *Nature Astronomy*, 8, 359.
- [106]*† Fried, Z., Lee, K.L.K., Byrne, A., & McGuire, B.A., "Implementation of Rare Isotopologues into Machine Learning of the Chemical Inventory of the Solar-Type Protostellar Source IRAS 16293-2422," **2023**, *Digital Discovery*, 2, 952.
- [105]† Scolati, H., Remijan, A.J., Herbst, E., McGuire, B.A., & Lee, K.L.K., "Explaining the Chemical Inventory of Orion KL through Machine Learning," **2023**, *Astrophysical Journal*, 959, 108.
- [104] Drozdovskaya, M.N., Bockel'ee-Morvan, D., Crovisier, J., McGuire, B.A., Biver, N., Charnley, S.B., Cordiner, M.A., Milam, S.N., Opatom, C., & Remijan, A.J., "Low $\text{NH}_3/\text{H}_2\text{O}$ Ratio in Comet C/2020 F3 (NEOWISE) at 0.7 au from the Sun," **2023**, *Astronomy & Astrophysics*, 677, A157.
- [103] Sturm, J.A., McClure, M.K., Beck, T.L., Harsono, D., and 22 co-authors including McGuire, B.A., "A JWST inventory of protoplanetary disk ices: The edge-on protoplanetary disk HH 48 NE, seen with the Ice Age ERS program," **2023**, *Astronomy & Astrophysics*, 679, A138.
- [102]*† Byrne, A., Xue, C., Cooke, I.R., McCarthy, M.C., & McGuire, B.A., "Astrochemical modeling of propargyl radical chemistry in TMC-1," **2023**, *Astrophysical Journal*, 957, 88.
- [101]† Tennis, J., Xue, C., Talbi, D., Changala, P.B., Sita, M., McGuire, B.A., & Herbst, E., "Detection and modelling of CH_3NC in TMC-1," **2023**, *Monthly Notices of the Royal Astronomical Society*, 525, 2154.
- [100] Chen, Y., van Gelder, M., Nazari, P., Brogan, C.L., van Dishoeck, E.F., Linnartz, H., Jørgensen, J.K., Hunter, T.R., Wilkins, O., Blake, G.A., Caselli, P., Chuang, K.-J., Codella, C., Cooke, I.R., Drozdovskaya, M.N., Garrod, R.T., Ioppolo, S., Jin, M., Kulterer, B.M., Ligterink, N.F.W., Lipnicky, A., Loomis, R.A., Rachid, M.G., Spezzano, S., & McGuire, B.A., "CoCCoA: Complex Chemistry in hot Cores with ALMA. Selected oxygen-bearing species," **2023**, *Astronomy & Astrophysics*, 678, A137.
- [99]*† Cooke, I.R., Xue, C., Changala, P.B., Shay, H., Byrne, A., Tang, Q., Fried, Z., Lee, K.L.K., Loomis, R.A., Lamberts, T., Remijan, A.J., Burkhardt, A.M., Herbst, E., McCarthy, M.C., & McGuire, B.A., "Detection of Interstellar E-1-cyano-1,3-butadiene in GOTHAM Observations of TMC-1," **2023**, *Astrophysical Journal*, 948, 133.

- [98] Chown, R., Sidhu, A., Peeters, E., Tielens, A.G.G.M., and 135 co-authors including McGuire, B.A., "PDRs4All IV. An embarrassment of riches: Aromatic infrared bands in the Orion Bar," **2023**, *Astronomy & Astrophysics*, 685, A75.
- [97] Wright, M., Hirota, T., Forbrich, J., Plambeck, R., Bally, J., Goddi, C., Ginsburg, A., & McGuire, B.A., "An Ionized Outflow in Orion-KL Source I?," **2023**, *Astrophysical Journal*, 945, 14.
- [96] Bianchi, E., Remijan, A.J., Codella, C., Ceccarelli, C., Lique, F., Spezzano, S., Balucani, N., Caselli, P., Herbst, E., Podio, L., Vastel, C., & McGuire, B.A., "Cyanopolyne chemistry in the L1544 prestellar core: new insights from GBT observations," **2023**, *Astrophysical Journal*, 944, 208.
- [95]† Remijan, A.J., Scolati, H., Burkhardt, A.M., Changala, P.B., Charnley, S.B., Cooke, I.R., Cordiner, M.A., Gupta, H., Herbst, E., Lee, K.L.K., Loomis, R.A., Shingledecker, C.N., Siebert, M.A., Xue, C., McCarthy, M.C., & McGuire, B.A., "Astronomical detection of the interstellar anion $C_{10}H^-$ towards TMC-1 from the GOTHAM large program on the GBT," **2023**, *Astrophysical Journal Lett.*, 944, L35.
- [94] McClure, M.K., Rocha, W.R.M., Pontoppidan, K.M., Crouzet, N., and 36 co-authors including McGuire, B.A., "IceAge I: JWST reveals dense molecular cloud ice inventory," **2023**, *Nature Astronomy*, 7, 431.
- [93] Ginsburg, A., McGuire, B.A., Sanhueze, P., Olguin, F., Maud, L., Tanaka, K., Zhang, Y., Beuther, H., & Indriolo, N., "Salt-bearing disk candidates around high-mass young stellar objects," **2023**, *Astrophysical Journal Lett.*, 942, L66.
- [92]† Schuessler, C., Remijan, A.J., Xue, C., & McGuire, B.A., "Searching for peptide-like propionamide ($C_2H_5CONH_2$) toward Sgr B2 at centimeter wavelengths," **2022**, *Astrophysical Journal*, 941, 102.
- [91] Cordiner, M.A., Villanueva, G.L., Wiesemeyer, H., Milam, S.N., and 12 co-authors including McGuire, B.A., "Phosphine in the Venusian Atmosphere: A Strict Upper Limit from SOFIA GREAT Observations," **2022**, *Geophysical Research Letters*, 49, e2022GL101055.
- [90]† Sita, M., Changala, P.B., Xue, C., Burkhardt, A.M., Shingledecker, C.N., Lee, K.L.K., Loomis, R.A., Momjian, E., Siebert, M.A., Herbst, E., Remijan, A.J., McCarthy, M.C., Cooke, I.R., & McGuire, B.A., "Discovery of interstellar 2-cyanoindene ($2-C_9H_7CN$) in GOTHAM observations of TMC-1," **2022**, *Astrophysical Journal Lett.*, 938, L12.
- [89] Novo, M.S., Alonso, J.L., Rivilla, V.M., McGuire, B.A., León, I., Mata, S., Jiménez-Serra, I., & Martín-Pintado, J., "Laboratory Detection and Astronomical Study of Interstellar Acetohydroxamic Acid, a Glycine Isomer," **2022**, *Astronomy & Astrophysics*, 666, A134.
- [88] Shingledecker, C.N., Banu, T., Kang, Y., Wei, H., Wandishin, J.T., Nobis, G., Jarvis, V., Quinn, F., Quinn, G., McCarthy, M.C., McGuire, B.A., & Kaestner, J., "Grain-surface hydrogen-addition reactions as a chemical link between cold cores and hot corinos: The case of H_2CCS and CH_3CH_2SH ," **2022**, *Journal of Physical Chemistry A*, 126, 5343.
- [87]† Proppe, A.H., Lee, K.L.K., Cortes, C.L., Saif, M., Berksinsky, D.B., Sverko, T., Sun, W., Cassidy, J., Zamkov, M., Kim, T., Jang, E., Gray, S.K., McGuire, B.A., & Bawendi, M.G., "An adversarial autoencoder ensemble for fast, accurate, and probabilistic reconstructions of few-shot photon correlation functions," **2022**, *Physical Review B*, 106, 045425.
- [86]† Mishra, P., Hull, A., Barnum, T.J., McGuire, B.A., & Field, R., "Chirped-pulse Fourier-transform millimeter-wave rotational spectroscopy of furan in its v_{10} and v_{13} excited vibrational states," **2022**, *Journal of Molecular Spectroscopy*, 388, 111686.
- [85] Berné, O., Habart, E., Peeters, E., Abergel, A., and 133 co-authors including McGuire, B.A., "PDRs4All: A JWST Early Release Science Program on Radiative Feedback from Massive Stars," **2022**, *Publications of the Astronomical Society of the Pacific*, 134, 054301.
- [84]† Barnum, T.J., Siebert, M.A., Lee, K.L.K., Loomis, R.A., Changala, P.B., Charnley, S.B., Sita, M., Xue, C., Remijan, A.J., McGuire, B.A., & Cooke, I.R., "A search for heterocycles in GOTHAM observations of TMC-1," **2022**, *Journal of Physical Chemistry A*, 126, 2716.
- [83] McGuire, B.A., "2021 Census of interstellar, circumstellar, extragalactic, protoplanetary disk, and exoplanetary molecules," **2022**, *Astrophysical Journal Suppl.*, 259, 30.

- [82]† Margulés, L., Remijan, A.J., Belloche, A., Motiyenko, R., McGuire, B.A., Xue, C., Müller, H.S.P., Garrod, R.T., Menten, K.M., & Guillemin, J.-C., "Submillimeter wave spectroscopy and astronomical search for 1-propanimine," **2022**, *Astronomy & Astrophysics*, 663, A132.
- [81] Dzenis, K., Faure, A., McGuire, B.A., Remijan, A.J., Dagdigan, P.J., Rist, C., Dawes, R., Quintas-Sánchez, E., Lique, F., & Hochlaf, M., "Collisional excitation and non-LTE modelling of interstellar chiral propylene oxide," **2022**, *Astrophysical Journal*, 926, 3.
- [80]† Remijan, A.J., Xue, C., Margulés, L., Belloche, A., Motiyenko, R., Carder, J., Codella, C., Balucani, N., Brogan, C.L., Ceccarelli, C., Hunter, T.R., Maris, A., Melandri, S., Siebert, M.A., & McGuire, B.A., "Expanding the submillimeter wave spectroscopy and astronomical search for thioacetamide (CH_3CSNH_2) in the ISM," **2022**, *Astronomy & Astrophysics*, 658, A85.
- [79] Bergner, J.B., Shirley, Y.L., Jørgensen, J.K., McGuire, B.A., Jørgensen, J.K., and 13 co-authors "Astrochemistry with the Orbiting Astronomical Satellite for Investigating Stellar Systems (OASIS)," **2022**, *Frontiers in Astronomy and Space Sciences*, 8, 793922.
- [78] Wright, M., Bally, J., Hirota, T., Miller, K., Harding, T., Colletuori, K., Ginsburg, A., Goddi, C., & McGuire, B.A., "Structure of the Source I disk in Orion-KL," **2022**, *Astrophysical Journal*, 924, 107.
- [77]† Siebert, M.A., Lee, K.L.K., Remijan, A.J., Burkhardt, A.M., McCarthy, M.C., & McGuire, B.A., "CH₃-terminated carbon chains in the GOTHAM survey of TMC-1: Discovery of interstellar $\text{CH}_3\text{C}_7\text{N}$," **2022**, *Astrophysical Journal*, 924, 21.
- [76] He, J., Simons, M., Fedoseev, G., Chuang, K.-J., Qasim, D., Ioppolo, S., McGuire, B.A., Cuppen, H., & Linnartz, H., "Methoxymethanol formation starting from CO-hydrogenation," **2022**, *Astronomy & Astrophysics*, 659, A65.
- [75]† Barnum, T.J., Lee, K.L.K., & McGuire, B.A., "Chirped-pulse Fourier transform millimeter-wave spectroscopy of furan, isotopologues, and vibrational excited states," **2021**, *ACS Earth and Space Chemistry*, 5, 2986.
- [74]† Chitarra, O., Martin-Drumel, M.-A., Lee, K.L.K., Buchanan, Z., Melosso, M., McGuire, B.A., Goubet, M., & Piralì, O., "Hunting the relatives of benzonitrile: Rotational spectroscopy of dicyanobenzenes," **2021**, *Astronomy & Astrophysics*, 652, A163.
- [73]† Lee, K.L.K., Patterson, J., Burkhardt, A.M., Vankayalapati, V., McCarthy, M.C., & McGuire, B.A., "Machine learning of interstellar chemical inventories," **2021**, *Astrophysical Journal Lett.*, 917, L6.
- [72]† Burkhardt, A.M., Lee, K.L.K., Changala, P.B., Shingledecker, C.N., Cooke, I.R., Loomis, R.A., Wei, H., Charnley, S.B., Herbst, E., McCarthy, M.C., & McGuire, B.A., "Discovery of the pure polycyclic aromatic hydrocarbon indene ($c\text{-C}_9\text{H}_8$), with GOTHAM observations of TMC-1," **2021**, *Astrophysical Journal Lett.*, 913, L18.
- [71]† Shingledecker, C.N., Lee, K.L.K., Wandishin, J.T., Balucani, N., Burkhardt, A.M., Charnley, S.B., Loomis, R.A., Schreffler, M., Siebert, M.A., McCarthy, M.C., & McGuire, B.A., "Detection of interstellar $\text{H}_2\text{CCCHC}_3\text{N}$. A link between chains and rings in cold cores?," **2021**, *Astronomy & Astrophysics Letters*, 652, L12.
- [70] Hunter, T.R., Brogan, C.L., de Buizer, J.M., Towner, A.P.M., Dowell, C.D., MacLeod, G.C., Stecklum, B., Cyganowski, C.J., El-Abd, S., & McGuire, B.A., "The extraordinary outburst in the massive protostellar system NGC 6334I-MM1: Strong increase in mid-infrared continuum emission," **2021**, *Astrophysical Journal Lett.*, 912, L17.
- [69] McCarthy, M.C., & McGuire, B.A., "Aromatics and cyclic molecules in molecular clouds: A new dimension of interstellar organic chemistry," **2021**, *Journal of Physical Chemistry A*, 125, 3231.
- [68]† McGuire, B.A., Loomis, R.A., Burkhardt, A.M., Lee, K.L.K., Charnley, S.B., Cooke, I.R., Cordiner, M.A., Herbst, E., Kalenskii, S., Remijan, A.J., Shingledecker, C.N., Siebert, M.A., Willis, E.R., Xue, C., & McCarthy, M.C., "Detection of two interstellar polycyclic aromatic hydrocarbons via spectral matched filtering," **2021**, *Science*, 371, 1265.
- [67]† Lee, K.L.K., Changala, P.B., Loomis, R.A., Burkhardt, A.M., Xue, C., Cordiner, M.A., Charnley, S.B., McCarthy, M.C., & McGuire, B.A., "Interstellar detection of 2-cyanocyclopentadiene, $\text{C}_5\text{H}_5\text{N}$, a second five-membered ring toward TMC-1," **2021**, *Astrophysical Journal Lett.*, 910, L2.

- [66]† Lee, K.L.K., Loomis, R.A., Burkhardt, A.M., Cooke, I.R., Xue, C., Siebert, M.A., Shingledecker, C.N., Remijan, A.J., Charnley, S.B., McCarthy, M.C., & McGuire, B.A., "Discovery of interstellar *trans*-cyanovinylacetylene ($\text{HC}\equiv\text{CCH}=\text{CHC}\equiv\text{N}$) and vinylcyanoacetylene ($\text{H}_2\text{C}=\text{CHC}_3\text{N}$) in GOTHAM observations of TMC-1," **2021**, *Astrophysical Journal Lett.*, 908, L11.
- [65]† Loomis, R.A., Burkhardt, A.M., Charnley, S.B., Cordiner, M.A., Herbst, E., Kalenskii, S., Lee, K.L.K., McCarthy, M.C., Remijan, A.J., Shingledecker, C.N., Willis, E.R., Xue, C., & McGuire, B.A., "An investigation of spectral line stacking and matched filter techniques: Application to the detection of HC_{11}N ," **2021**, *Nature Astronomy*, 5, 188.
- [64]† Burkhardt, A.M., Lee, K.L.K., Loomis, R.A., Remijan, A.J., McCarthy, M.C., & McGuire, B.A., "Ubiquitous aromatic carbon chemistry at the earliest stages of star formation," **2021**, *Nature Astronomy*, 5, 181.
- [63]† McCarthy, M.C., Lee, K.L.K., Loomis, R.A., Burkhardt, A.M., Charnley, S.B., Cordiner, M.A., Herbst, E., Kalenskii, S., Remijan, A.J., Shingledecker, C.N., Willis, E.R., Xue, C., & McGuire, B.A., "Detection of interstellar cyanocyclopentadiene, *c*- $\text{C}_5\text{H}_5\text{CN}$, a highly polar five-membered ring," **2021**, *Nature Astronomy*, 5, 176.
- [62] Melosso, M., Dore, L., Tamassia, F., Brogan, C.L., Hunter, T.R., & McGuire, B.A., "The sub-millimeter rotational spectrum of ethylene glycol up to 890 GHz and application to ALMA Band 10 spectral line data of NGC 6334I," **2020**, *Journal of Physical Chemistry A*, 124, 240.
- [61] Ligterink, N.F.W., El-Abd, S., Brogan, C.L., Hunter, T.R., Remijan, A.J., Garrod, R.T., & McGuire, B.A., "The family of amide molecules toward NGC 6334I," **2020**, *Astrophysical Journal*, 901, 37.
- [60] Siebert, M.A., Simon, I., Shingledecker, C.N., Carroll, P.B., Burkhardt, A.M., Booth, S.T., Remijan, A.J., McGuire, B.A., Aladro, R., & Duran, C.A., "A search for light hydrides in the envelopes of evolved stars," **2020**, *Astrophysical Journal*, 901, 22.
- [59]† McGuire, B.A., Burkhardt, A.M., Loomis, R.A., Lee, K.L.K., Charnley, S.B., Cordiner, M.A., Herbst, E., Kalenskii, S., Momjian, E., Shingledecker, C.N., Willis, E.R., Xue, C., Remijan, A.J., & McCarthy, M.C., "Early science from GOTHAM: Project overview, methods, and the detection of interstellar propargyl cyanide (HCCCH_2CN) in TMC-1," **2020**, *Astrophysical Journal Lett.*, 900, L10.
- [58]† Xue, C., Willis, E.R., Loomis, R.A., Burkhardt, A.M., Charnley, S.B., Cordiner, M.A., Herbst, E., Kalenskii, S., Lee, K.L.K., McCarthy, M.C., Remijan, A.J., Shingledecker, C.N., & McGuire, B.A., "Early science from GOTHAM: Detection of interstellar HC_4NC and an investigation of CN/NC formation chemistry in TMC-1," **2020**, *Astrophysical Journal Lett.*, 900, L9.
- [57] McGuire, B.A., Brünken, S., Asvany, O., & Schlemmer, S., "Laboratory spectroscopy techniques to enable observations of interstellar ion chemistry," **2020**, *Nature Reviews Physics*, 2, 402.

Other Refereed Publications (56)

- [56] Margulés, L., Ilyushin, V.V., McGuire, B.A., Belloche, A., Motiyenko, R., Remijan, A.J., Alekseev, E.A., Dorovskaya, O., & Guillemin, J.-C., "Submillimeter-wave spectroscopy of and interstellar search for thioacetaldehyde," **2020**, *Journal of Molecular Spectroscopy*, 371, 111304.
- [55] Margulés, L., McGuire, B.A., Evans, C.J., Motiyenko, R., Remijan, A.J., Guillemin, J.-C., Wong, A., & McNaughton, D., "Submillimeter-wave spectroscopy and radio-astronomical investigation of propynethial (HCCCHS)," **2020**, *Astronomy & Astrophysics*, 642, A206.
- [54] Margulés, L., McGuire, B.A., Motiyenko, R., Brogan, C.L., Hunter, T.R., Remijan, A.J., & Guillemin, J.-C., "Millimeter wave spectroscopy of cyanoketene ($\text{NC-CH}=\text{C}=\text{O}$) and its ISM search," **2020**, *Astronomy & Astrophysics*, 638, A3.
- [53] Wright, M., Plambeck, R., Hirota, T., Ginsburg, A., McGuire, B.A., Bally, J., & Goddi, C., "Observations of Orion Source I and Outflow Interface," **2020**, *Astrophysical Journal*, 889, 155.
- [52] McGuire, B.A., Shingledecker, C.N., Willis, E.R., Lee, K.L.K., Martin-Drumel, M.-A., Blake, G.A., Brogan, C.L., Burkhardt, A.M., Caselli, P., Chuang, K.-J., El-Abd, S., Hunter, T.R., Ioppolo, S., Linnartz, H., Remijan, A.J., Xue, C., & McCarthy, M.C., "Searches for Interstellar HCCSH and H_2CCS ," **2019**, *Astrophysical Journal*, 883, 201.

- [51] El-Abd, S., Brogan, C.L., Hunter, T.R., Willis, E.R., Garrod, R.T., & McGuire, B.A., "Interstellar glycolaldehyde, methyl formate, and acetic acid I: A bi-modal abundance pattern in star-forming regions," **2019**, *Astrophysical Journal*, 883, 129.
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- [48] Brogan, C.L., Hunter, T.R., Towner, A.P.M., McGuire, B.A., Towner, A.P.M., and 24 co-authors "Sub-arcsecond (sub)millimeter imaging of the massive protocluster G358.93-0.03: Discovery of 14 new methanol maser lines associated with a hot core," **2019**, *Astrophysical Journal Lett.*, 881, L39.
- [47] Burkhardt, A.M., Shingledecker, C.N., Le Gal, R., McGuire, B.A., Remijan, A.J., & Herbst, E., "Modeling C-shock chemistry in isolated molecular outflows: A case study of L1157," **2019**, *Astrophysical Journal*, 881, 32.
- [46] Melosso, M., McGuire, B.A., Tamassia, F., Esposti, C.D., & Dore, L., "Astronomical search of vinyl alcohol assisted by submillimeter spectroscopy," **2019**, *ACS Earth and Space Chemistry*, 3, 1189.
- [45] Bøgelund, E.G., McGuire, B.A., Hogerheijde, M.R., van Dishoeck, E.F., & Ligterink, N.F.W., "Methylamine and other simple N-bearing species in the hot cores NGC 6334I MM1-3," **2019**, *Astronomy & Astrophysics*, 624, A82.
- [44] Ginsburg, A., McGuire, B.A., Bally, J., Plambeck, R., Goddi, C., & Wright, M., "Orion SrcI's disk is salty," **2019**, *Astrophysical Journal*, 872, 54.
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- [41] McGuire, B.A., "2018 Census of interstellar, circumstellar, extragalactic, protoplanetary disk, and exoplanetary molecules," **2018**, *Astrophysical Journal Suppl.*, 239, 17.
- [40] Brogan, C.L., Hunter, T.R., Cyganowski, C.J., Chibueze, J.O., Friesen, R., Hirota, T., MacLeod, G.C., McGuire, B.A., & Sobolev, A.M., "The extraordinary outburst in the massive protostellar system NGC6334I-MM1: Flaring of the water masers in a north-south bipolar outflow driven by MM1B," **2018**, *Astrophysical Journal*, 866, 87.
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- [38] McGuire, B.A., Martin-Drumel, M.-A., Lee, K.L.K., Stanton, J.F., Gottlieb, C.A., & McCarthy, M.C., "Vibrational satellites of C₂S, C₃S, and C₄S: Microwave spectral taxonomy as a stepping stone to the millimeter-wave band," **2018**, *Physical Chemistry Chemical Physics*, 20, 13870.
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- [24] McGuire, B.A., Martin-Drumel, M.-A., Thorwirth, S., Brünken, S., Lattanzi, V., Neill, J.L., Spezzano, S., Yu, Z., Zaleski, D.P., Remijan, A.J., Pate, B.H., & McCarthy, M.C., "Molecular polymorphism: microwave spectra, equilibrium structures, and an astronomical investigation of the HNCS isomeric family," **2016**, *Physical Chemistry Chemical Physics*, 18, 22693.
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- [16] Carroll, P.B., McGuire, B.A., Remijan, A.J., Apponi, A.J., Ziurys, L.M., Lovas, F.J., & Blake, G.A., "The search for a complex molecule in a selected hot core region: a rigorous attempt to confirm trans-ethyl methyl ether toward W51 e1/e2," **2015**, *Astrophysical Journal*, 799, 15.
- [15] McGuire, B.A., Carroll, P.B., Boynton, A.N., Mendez, J.M., & Blake, G.A., "The ignition of thermite using the potassium chlorate "rocket" reaction: a systematic demonstration of reaction chemistry," **2015**, *Journal of Chemical Education*, 92, 1117.
- [14] Neill, J.L., Bergin, E.A., Lis, D.C., Schilke, P., and 17 co-authors including McGuire, B.A., "Herschel observations of EXtraOrdinary Sources: Analysis of the full Herschel/HIFI molecular line survey of Sagittarius B2(N)," **2014**, *Astrophysical Journal*, 789, 9.
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- [11] McGuire, B.A., Carroll, P.B., Sanders, J.L., Widicus Weaver, S.L., Blake, G.A., & Remijan, A.J., "A CSO search for *l*-C₃H⁺: Detection in the Orion Bar PDR," **2014**, *Monthly Notices of the Royal Astronomical Society*, 442, 2901.
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- [6] Carroll, P.B., McGuire, B.A., Zaleski, D.P., Neill, J.L., Pate, B.H., & Widicus Weaver, S.L., "The rotational spectra of glycolaldehyde isotopologues measured in natural abundance by chirped-pulse Fourier transform microwave spectroscopy," **2013**, *Journal of Molecular Spectroscopy*, 284, 21.
- [5] McGuire, B.A., Loomis, R.A., Charness, C.M., Corby, J.F., Blake, G.A., Hollis, J.M., Lovas, F.J., Jewell, P.R., & Remijan, A.J., "Interstellar carbodiimide (HNCNH) - A new astronomical detection from the GBT PRIMOS survey via maser emission features," **2012**, *Astrophysical Journal Lett.*, 758, L33.
- [4] Pulliam, R., McGuire, B.A., & Remijan, A.J., "A search for interstellar hydroxylamine (NH₂OH) toward select astronomical sources," **2012**, *Astrophysical Journal*, 751, 1.
- [3] McGuire, B.A., Wang, Y., Bowman, J.M., & Widicus Weaver, S.L., "Do H₅⁺ and its isotopologues have rotational spectra?," **2011**, *Journal of Physical Chemistry Letters*, 2, 1405.
- [2] Crabtree, K.N., Kauffman, C.A., Tom, B.A., Bečka, E., McGuire, B.A., & McCall, B.J., "Nuclear spin dependence of the reaction of H₃⁺ with H₂ II. Experimental measurements," **2011**, *Journal of Chemical Physics*, 134, 194311.

- [1] Lovas, F.J., Plusquellic, D.F., Widicus Weaver, S.L., McGuire, B.A., & Blake, G.A., "Organic compounds in the C₃H₆O₃ family: Microwave spectrum of cis-cis dimethyl carbonate," **2010**, *Journal of Molecular Spectroscopy*, 264, 10.

Book Chapters, White Papers, Conference Proceedings, Research Notes, and Other Publications

- [10] Four White Papers for the National Academies of Sciences 2020 Decadal Survey on Astronomy and Astrophysics in *Bulletins of the American Astronomical Society* (**2019**)
- McGuire, B.A. + 12 co-authors, "Lifting the Veil on Aromatic Chemistry: Complex Carbon Across the Stellar Life Cycle from Birth to the Afterlife."
 - McGuire, B.A. + 10 co-authors, "Closing Gaps in Our Astrochemical Heritage: From Molecular Clouds to Planets."
 - McGuire, B.A., Carroll, P.B., Garrod, R.T., & Remijan, A.J., "Revealing Chemical Evolution Throughout the Star-Formation Process."
 - Savin, D.W. + 38 co-authors (inc. B.A. McGuire), "Astrophysical Science Enabled by Laboratory Astrophysics Studies in Atomic, Molecular, and Optical (AMO) Physics."
- [9] Two Chapters in *Science with a Next-Generation Very Large Array*, E. Murphy, Ed.; ASP Conference Series (**2018**)
- McGuire, B.A., Carroll, P.B., & Garrod, R.T., "Prebiotic Molecules."
 - McGuire, B.A., Bergin, E., Blake, G.A., Burkhardt, A.M., Cleeves, L.I., Loomis, R.A., Remijan, A.J., Shingledecker, C.N., & Willis, E.R., "Observing the Effects of Chemistry on Exoplanets and Planet Formation."
- [8] Five Chapters in *The Encyclopedia of Astrobiology*, Gargaud, M. & Wakelam, V., Eds.; Springer Reference (**2018** and **2021** Eds.)
- McGuire, B.A., "Methoxymethanol."
 - McGuire, B.A., "Benzonitrile."
 - McGuire, B.A. & Carroll, P.B., "Propylene oxide."
 - McGuire, B.A. & Remijan, A. J., "Molecular line surveys."
 - McGuire, B.A., Corby, J.F., Carroll, P.B., & Remijan, A. J., "Sgr B2."
- [7] McGuire, B.A., Bergin, E.A., Blake, G.A., Burkhardt, A.M., Cleeves, L.I., Loomis, R.A., Remijan, A.J., Shingledecker, C.N., & Willis, E.R., "Observing the effects of chemistry on exoplanets and planet formation," **2018** *National Academies Panel on Exoplanet Science*.
- [6] McGuire, B.A. & Carroll, P.B., "The final integrations of the Caltech Submillimeter Observatory," **2017** *Research Notes of the American Astronomical Society* 1, 4.
- [5] McGuire, B.A. & Carroll, P.B., "Mirror asymmetry in life and in space," **2016** *Physics Today* 69(11), 86-87.
- [4] McGuire, B.A., "Time-domain TeraHertz spectroscopy and observational probes of prebiotic interstellar gas and ice chemistry," *Ph.D. Thesis*, California Institute of Technology (**2014**).
- [3] McGuire, B.A., Carroll, P. B., & Remijan, A. J., "A CSO broadband spectral line survey of Sgr B2(N)-LMH from 260 - 286 GHz," **2013** *arXiv/astro-ph: 1306.0927*
- [2] Lovas, F.J., Plusquellic, D.F., Widicus Weaver, S.L., McGuire, B.A., & Blake, G.A., "Organic compounds in the C₃H₆O₃ family: Microwave spectrum of cis-cis dimethyl carbonate," **2011** *Proc. of: The 2010 NASA Laboratory Astrophysics Workshop*.
- [1] Carroll, P.B., McGuire, B.A., & Widicus Weaver, S.L., "Construction of a high-resolution Terahertz cavity ringdown spectrometer," **2011** *Proc. of: The 2010 NASA Laboratory Astrophysics Workshop*.

SELECTED RECENT INVITED TALKS (110 TOTAL FROM 2012 - PRESENT)

- McGuire, B.A., "The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation." *Max-Planck Institute for Astronomy; Germany*, July 2024.
- McGuire, B.A., "The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation." *Max-Planck Institute for Nuclear Physics; Germany*, July 2024.
- McGuire, B.A., "The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation." *SUNY Stony Brook*, April 2024.
- McGuire, B.A., "Applications of Machine Learning to Molecular Discovery in Astrochemistry." *Molecular Astrophysics: Recent Successes and Future Challenges; Deauville, France*, March 2024.
- McGuire, B.A., "Astrochemistry: A Review." *Kavli-IAU Workshop on Global Coordination, Caltech*, March 2024.
- McGuire, B.A., "Plenary: The PAH Revolution." *243rd Meeting of the American Astronomical Society*, January 2024.

TEACHING EXPERIENCE

- Professor, Chemistry 5.111: Principles of Chemical Science *Massachusetts Institute of Technology*, Fall 2024
- Professor, Chemistry 5.602: Thermodynamics II and Kinetics *Massachusetts Institute of Technology*, Fall 2024
- Professor, Chemistry 5.111: Principles of Chemical Science *Massachusetts Institute of Technology*, Spring 2024
- Professor, Chemistry 5.602: Thermodynamics II and Kinetics *Massachusetts Institute of Technology*, Fall 2023
- Professor, Chemistry 5.111: Principles of Chemical Science *Massachusetts Institute of Technology*, Spring 2023
- Professor, Chemistry 5.602: Thermodynamics II and Kinetics *Massachusetts Institute of Technology*, Spring 2023
- Professor, Chemistry 5.111: Principles of Chemical Science *Massachusetts Institute of Technology*, Spring 2022
- Professor, Chemistry 5.602: Thermodynamics II and Kinetics *Massachusetts Institute of Technology*, Fall 2021
- Professor, Chemistry 5.111: Principles of Chemical Science *Massachusetts Institute of Technology*, Spring 2021
- Professor, Physical Chemistry I: Quantum Mechanics and Spectroscopy for Majors *University of Illinois at Urbana-Champaign*, 2018
- Designed and co-Taught Graduate Course: Cosmochemistry and Extraterrestrial Life *California Institute of Technology*, 2014
- Curriculum Development Fellow, Physical Chemistry Lab *Emory University*, 2011

MENTORING EXPERIENCE

Current position indicated when known.

- Postdoctoral Scholars Mentored
 - Holdren, Martin, 2023 – Present
 - Marimuthu, Aravindh, 2023 – Present
 - Xue, Ci (Ceci), 2021 – Present
 - Wenzel, Gabi, 2022 – Present
 - Lee, Kin Long Kelvin, *Intel Corp.* 2020 – 2021
 - Barnum, Timothy, 2020 – 2021, *Asst. Professor of Chemistry, Union College*
- Graduate Students Mentored
 - Byrne, Alex, 2021 – Present, *MIT*
 - Duffy, Miya, 2022 – Present, *MIT*
 - Shay, Hannah, 2021 – Present, *MIT*
 - Stewart, David (Archie), 2022 – Present, *MIT*
 - Fried, Zachary (Zach), 2021 – Present, *MIT*
 - Cheung, So Yee (Jasmine), 2022 – 2024, *Flagship Pioneering Database and Application Programming Interface Development for Rotational Spectroscopy*
M.S. in Chemistry from MIT
 - El-Abd, Samer J, 2017 – 2024
A Chemical Exploration of Massive Star-Forming Regions: Unraveling the Molecular Complexity of Hot Cores
Degree obtained from the University of Virginia
- UROP Students Supervised
 - Gough, Brian, Fall 2021, Spring 2022, *MIT*

PROFESSIONAL SOCIETIES

2010 – American Chemical Society
 2012 – American Astronomical Society
 2018 – International Astronomical Union
 2021 – 2024 American Physical Society
 2016 – 2021 American Association for the Advancement of Science
 2014 – 2016 Royal Society of Chemistry

SERVICE & OUTREACH

Internal MIT Service

- Chemistry Graduate Admissions Committee; 2021 – Present
- Department of Chemistry Seminars Committee; 2021 – Present
- MIT School of Science Advanced Degrees Ceremony; 2024
- Haystack Observatory Promotion Committee; 2022
- Modern Optics and Spectroscopy Seminar Series Committee; 2020 – 2022

External Service

- NRAO/GBO Facilities Users Committee; Member (2021–2022), Vice-Chair (2023), Chair (2024), Past-Chair (2025)

-
- Next-Generation Very Large Array Science Advisory Council Executive Committee; 2021 – Present
Chair, Astrochemistry (Key Science Goal 2) Science Working Group
 - ALMA North American Scientific Advisory Committee (ANASAC); 2022 – Present
 - Member, International Astronomical Union Astrochemistry Division Organizing Committee, 2024 – Present
 - Officer, AAS Laboratory Astrophysics Division; 2020 – 2024

Public and Scientific Community Outreach

- Chair, Scientific Organizing Committee, *Astrochemistry in the Wideband Era*, 2025
- Founder and Host, Astrochem Coffee Podcast; 2023 – Present
coffee.astrochem.net
- Science Professional Panelist at DragonCon; 2019, 2023, 2024
- Founder and Chair, Global Astrochemistry Discussions Series; 2020 – 2023
discussions.astrochem.net
- Organizer, Astronomy on Tap Charlottesville; 2019 – 2021
- Scientific Organizing Committee, NRAO/GBO Virtual Internal Science Series; 2020 - 2021
- Science Professional Panelist at AwesomeCon: New Discoveries from the Invisible Universe!; 2019
- Panelist for ACS Program in a Box: *Voyage to Mars: Red Planet Chemistry*; 2018
- Scientific/Local Organizing Committee, *Radio/Millimeter Astrophysical Frontiers in the Next Decade*; 2019
- Conference Chair, 2017 Astrobiology Graduate Conference; 2017
- Co-Organizer, *ALMA's Molecular Universe'* Mini-Symposium at the International Symposium on Molecular Spectroscopy; 2017
- Conference Chair, *NRAO Postdoctoral Fellows Symposium*; 2017
- Chair, Scientific Organizing Committee, Astrobiology Graduate Conference; 2014 – 2016
- Conference Chair, *Molecular Gas in Galactic Environments*; 2016
- Session Organizer, *Interstellar Chemical Evolution: Astrochemistry from Atoms to Amino Acids* at the Astrobiology Science Conference, 2015
- Tour Guide, Combined Array for Research in Millimeter-wave Astronomy Public Open House; 2012, 2013, 2014
- Group Leader, Kids and Chemistry Outreach Program at University of Illinois, 2006 – 2007
- Kids and Chemistry Outreach Program at University of Illinois, 2005 – 2006

Peer Review

- Reviewer for NSF CAREER Program, NSF Astronomy Programs, NASA ROSES Programs, NASA Fellowship Programs, Alexander von Humboldt Fellowship, United Kingdom Science & Technology Facilities Council, the Atacama Large Millimeter/sub-millimeter Array, and the Submillimeter Array
- Referee for Nature, Angewandte Chemie, Nature Communications, Nature Astronomy, Journal of the American Chemical Society, Physical Review Letters, ACS Central Science, Physical Chemistry Chemical Physics, Spectrochimica Acta A, Journal of Physical Chemistry A, Journal of Chemical Physics, ACS Earth and Space Chemistry, Journal of Molecular Spectroscopy, Journal of Quantitative Spectroscopy and Radiative Transfer, The Astrophysical Journal Letters, The Astrophysical Journal, Astronomy & Astrophysics, Molecular Astrophysics, and Astronomy and Computing, Frontiers in Astronomy and Space Sciences