

# BRETT A. MCGUIRE

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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**
  - 2021 – *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

- 2023 Kavli Fellow
- 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](#)

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### Refereed Publications At MIT (61)

- [117] 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*, submitted.
- [116] 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*, submitted.
- [115] 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*, submitted.
- [114] 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.*, in revision.
- [113]\* 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.*, accepted.
- [112] 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*, in revision.
- [111] Berné, O., Habart, E., Peeters, E., Schroetter, I., and 143 co-authors including [McGuire, B.A.](#), "Observations of the Far-Ultraviolet-driven photoevaporation flow from a protoplanetary disk," **2024**, *Science*, 383, 988.
- [110]\* 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*, accepted.
- [109] 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.
- [108] 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.
- [107] Chown, R., Sidhu, A., Peeters, E., Tielens, A.G.G.M., and 138 co-authors including [McGuire, B.A.](#), "PDRs4All IV. An embarrassment of riches: Aromatic infrared bands in the Orion Bar," **2023**, *Astronomy & Astrophysics*, accepted.
- [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] Habart, E., Peeters, E., Berné, O., Trahin, B., and 142 co-authors including [McGuire, B.A.](#), "PDRs4All II: JWST's NIR and MIR imaging view of the Orion Nebula," **2023**, *Astronomy & Astrophysics*, accepted.
- [104] 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.
- [103] 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 NH<sub>3</sub>/H<sub>2</sub>O Ratio in Comet C/2020 F3 (NEOWISE) at 0.7 au from the Sun," **2023**, *Astronomy & Astrophysics*, 677, A157.
- [102] 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.

- [101]\* 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.
- [100] Tennis, J., Xue, C., Talbi, D., Changala, P.B., Sita, M., McGuire, B.A., & Herbst, E., "Detection and modelling of CH<sub>3</sub>NC in TMC-1," **2023**, *Monthly Notices of the Royal Astronomical Society*, 525, 2154.
- [99] 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.
- [98]\* 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.
- [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<sub>10</sub>H<sup>-</sup> 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<sub>2</sub>H<sub>5</sub>CONH<sub>2</sub>) 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<sub>9</sub>H<sub>7</sub>CN) 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<sub>2</sub>CCS and CH<sub>3</sub>CH<sub>2</sub>SH," **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  $\nu_{10}$  and  $\nu_{13}$  excited vibrational states," **2022**, *Journal of Molecular Spectroscopy*, 388, 111686.

- [85] Berné, O., Habart, E., Peeters, E., Abergel, A., and 134 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 ( $\text{CH}_3\text{CSNH}_2$ ) in the ISM," 2022, *Astrophysical Journal*, 658, 85.
- [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., "CH<sub>3</sub>-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., & Pirali, 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, C<sub>5</sub>H<sub>5</sub>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 (HC≡CCH=CHC≡N) and vinylcyanoacetylene (H<sub>2</sub>C=CHC<sub>3</sub>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<sub>11</sub>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*-C<sub>5</sub>H<sub>5</sub>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<sub>2</sub>CN) 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<sub>4</sub>NC 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 (NC-CH=C=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<sub>2</sub>CCS," **2019**, *Astrophysical Journal*, 883, 201.
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### 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.
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- [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 (88 TOTAL FROM 2012 - PRESENT)

- McGuire, B.A., "How Do We Escape the Problem-Solving Potential Well in Undergraduate Exams?." *The University of California Berkeley*, April 2023.
- McGuire, B.A., "The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation." *The University of California Berkeley*, April 2023.
- McGuire, B.A., "Unbiased Molecular Discovery: Laboratory and Machine Learning Approaches to Expanding Our View of Interstellar Chemistry." *Meeting of the American Physical Society*, March 2023.
- McGuire, B.A., "From Astrochemistry to Astrobiology: Next-Generation Radio Telescopes Enabling Next-Generation Molecular Discovery." *241<sup>st</sup> Meeting of the American Astronomical Society*, January 2023.
- McGuire, B.A., "The PAH Revolution: Cold, Dark Carbon at the Earliest Stages of Star Formation." *Johns Hopkins University*, October 2022.

## TEACHING EXPERIENCE

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

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## MENTORING EXPERIENCE

Current position indicated when known.

- Postdoctoral Scholars Mentored

- **Current**

- Dr. Martin Holdren
    - Dr. Aravindh Marimuthu
    - Dr. Ci (Ceci) Xue
    - Dr. Gabi Wenzel

- **Former**

- Dr. Kin Long Kelvin Lee, *Intel Corp.*
    - Prof. Timothy Barnum, *Asst. Professor of Chemistry, Union College*

- Graduate Students Mentored

- **Current**

- Alex Byrne (co-advised by Troy van Voorhis), *MIT*
    - Miya Duffy, *MIT*
    - Hannah Shay, *MIT*
    - David (Archie) Stewart, *MIT*
    - Zachary (Zach) Fried, *MIT*

- **Current - Secondary Mentor**

- Mark Siebert, *University of Virginia*
    - Samer El-Abd, *University of Virginia*
    - Haley Scolati, *University of Virginia*

- **Former - Primary Mentor**

- So Yee (Jasmine) Cheung, *M.S. Chemistry, Flagship Pioneering*

- **Former - Secondary Mentor**

- Dr. Ci (Ceci) Xue, *MIT*
    - Prof. Christopher Shingledecker, *Asst. Professor of Chemistry, Benedictine College*
    - Prof. Andrew Burkhardt, *Asst. Professor of Physics, Worcester State University*
    - Dr. Ryan Loomis, *Associate Scientist, National Radio Astronomy Observatory*
    - Dr. Joanna Corby

- Undergraduate Students Mentored

- **Former**

- Dr. Jay Kroll, *Instructor in Chemistry, University of Colorado at Boulder*
    - Dr. Daniel Sudrzynski, *Resident, University of Illinois College of Medicine*
    - Maddy Sita, *Northwestern University*
    - Niklaus Dollhopf
    - Daniel Guth
    - Jerry Feng
    - Mary Rad, *Rivanna Water and Sewer Authority*
    - Sophie Lang
    - Patrick Lanter, *University of Illinois Chicago College of Medicine*
    - Shawn Booth, *Software Engineer, National Radio Astronomy Observatory*
    - Eric Rohr, *Max Planck Institute Astronomy at the University of Heidelberg*
    - Ignacio Simon

## 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

## SELECTED RECENT SERVICE & OUTREACH

### Internal MIT Service

- Chemistry Graduate Admissions Committee
- Haystack Observatory Promotion Committee
- Department of Chemistry Seminars Committee
- Modern Optics and Spectroscopy Seminar Series Committee

### Advisory Committees

- NRAO/GBO Facilities Users Committee  
*Member (2021–2022), Vice-Chair (2023), Chair (2024)*
- Next-Generation Very Large Array (ngVLA) Science Advisory Council Executive Committee  
*Chair, Astrochemistry (Key Science Goal 2) Science Working Group*
- ALMA North American Scientific Advisory Committee (ANASAC)
- Officer, AAS Laboratory Astrophysics Division

### Public and Scientific Community Outreach

- Founder and Host, Astrochem Coffee Podcast ([coffee.astrochem.net](http://coffee.astrochem.net))
- Founder and Chair, Global Astrochemistry Discussions Series ([discussions.astrochem.net](http://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 2019 DragonCon: Astrochemistry, SETI, and the Origins of Life
- Science Professional Panelist at 2019 AwesomeCon: New Discoveries from the Invisible Universe!
- Panelist for ACS Program in a Box: *Voyage to Mars: Red Planet Chemistry*

### 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, and the Submillimeter Array
- Referee for Nature, Angewandte Chemie, Nature Communications, Nature Astronomy, 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