Brian J. Drouin

Senior Research Scientist – Jet Propulsion Laboratory

Professional Experience

Jet Propulsion Laboratory	(1999–present)
Senior Research Scientist	(2023-present)
Acting Manager, Earth Science Section	(2023-2023)
Deputy Manager, Earth Science Section	(2021-present)
Principal Scientist, Laboratory Spectroscopy and Instrument Development	(2018–present)
Group Supervisor, Laboratory Studies and Atmospheric Observations	(2015–2021)
Scientist, Earth and Space Sciences Division	(2001–2018)
Editor: Journal of Quantitative Spectroscopy and Radiative Transfer	(2019–present)
Journal of Molecular Spectroscopy	(2010–2014)
Member: HITRAN steering committee (2010-present) HITRAN committee	(2010–present)
Virtual Atomic and Molecular Data Centre (VAMDC)	(2010–present)
IEEE, AGU member	(2017–present)
California Institute of Technology Postdoctoral Scholar at JPL	(1999–2001)
University of Arizona, Department of Chemistry,	(1995–1999)

Education: Ph.D., Chemistry, University of Arizona (1999); B.S., Chemistry, University of Wisconsin (1995); B.S., Mathematics, University of Wisconsin (1995)

Beginning with microwave spectroscopy of organometallic compounds, Brian's Ph. D. work involved measurement and analyses of highly precise rotational transition frequencies of molecules in cold molecular beams. At JPL he has recorded and analyzed microwave, millimeter, submillimeter, far-infrared, mid-infrared and near-infrared spectra of both astrophysical and atmospheric molecules while developing hardware and software for state-of-the-art spectrometers. He has participated in seven field campaigns for deployment of submillimeter instruments onboard stratospheric balloons. He is responsible for measurements of molecular line-shape parameters for earth science sensing and astro-chemicals. He has built a field ready THz spectrometer for in-situ gas sensing and developed technologies and methods to enable compact low-mass, low power versions with similar capabilities. As project scientist for PREFIRE he worked extensively with technical staff to develop the instrument models and to plan and execute the calibration efforts and produced the calibrated radiance algorithm for flight. He administrates and is the primary contributor to the JPL spectral line catalog used throughout the spectroscopy and remote sensing communities.

Brian's mentoring and leadership skills have been honed through interaction with senior research scientists, research scientists, scientists, postdoctoral fellows, graduate students and undergraduates. At JPL he has served as deputy section manager and group supervisor to scientists and technologists and served as mentor to five postdoctoral fellows and advised three others who worked heavily in his laboratory. He has also hosted a half dozen graduate students whose research partially overlapped with the JPL spectroscopy laboratory and directly mentored seven undergraduate researchers. He has served on internal committees for technology advisement, principal selection, awards, and strategic planning.

Brian serves on both the MLS and OCO-2 science teams and leads the PREFIRE science team. He has participated in mission proposals as PI, instrument lead and as a science Co-I. He participates in NASA, R&TD and SBIR review panels and regularly reviews scientific manuscripts for both spectroscopy and instrumentation.

ROSES Principal Investigator Experience

ACT – Compact UV Spectropolarimetry enabled by meta-grating technologies	(2023 – present)
STOCOM – Oxygen A-band Spectroscopy	(2015 – present)
UARP/ACLAB – Spectroscopy for Atmospheric Research	(2005 – present)
PICASSO – Spectrometer-on-a-Chip	(2014 – 2022)
APRA – Measurements of State-to-State Collision Rates for Water	(2006 – 2013)
ASTID – Submillimeter Spectroscopic Gas Analysis for Life Detection	(2008 – 2012)
ADAP/Herschel – Laboratory Spectroscopy and Spectral Line Catalog	(2008 – 2011)

Brian Drouin – mentoring history

Postdoctoral Fellows: Lavanya Periasamy, Deacon Nemchick, Matthew Cich, Emily Brageot, Adam Daly, Shanshan Yu, Michael Dick, [informally Harshal Gupta, Carolyn Brauer, Ben Elliot]

Graduate Students: @Caltech; Leah Stevenson, Elizabeth Lunny, Julie Fry, Susanna Widicus-Weaver @Harvard; Alexander Raymond, @CU; Scott Egbert, David Yun, Nathan Malarich, Paul Schroeder, @JPL; Mazdak Kebria @CESR; Valerio Lattanzi @Arizona; Tyler Herman, Ambesh Singh;

Undergraduate Students: @JPL; Ananda Nole, William Waliser, Haley Lam, Hayk Haykopian, Alexander Raymond, Michael Rose, Lori Cheng, Wei Lin, Octav Duclos, Brendan Coffey, Marlon Ramos, Gregory Simonian @Arizona; Jennifer Dannemiller, Paul Cassak

Brian Drouin – Training transcript excerpts (excludes safety and mandatory trainings)

Media Essentials	8/23, 9/23
Preventing Harassment and Discrimination – For Supervisors	12/15, 4/17, 4/19, 5/21, 3/23
Managing Resources – Foundry Proposal Office	12/22
Annual Salary Review Process for Managers	10/22
Continuous Coaching	5/22
Inclusive Leadership	10/21
Mid-Level Leaders	7/21, 9/21
Bystander intervention Training for Managers	7/20
Managing Virtual Teams	5/20
EKS: Working in the JPL Environment	2/20
EKS: Employee Relations and Legal Aspects of Supervision	9/19
EKS: Compensation	7/19
Leading & Modeling Gender Intelligence	9/18
Inspiring Leader	4/18
Intellectual Property and Technology Transfer for Supervisors and Managers	9/17
Scientist/Mission Interface Workshop	9/17
Systems Engineering Workshop	11/16
Career Conversations for Mastering Dialogue	9/16
Bias in Decision Making	9/16
University Subcontract Workshop	6/16
Launchpad Program	6/16
Situational Leadership	4/16
Helping Others Succeed	3/16
The Stay Interview (For People Managers)	3/16
Extraordinary Leader	6/15
Title IX Training for Supervisors/Mentors/Leads	10/15

Brian Drouin – Publications: 40 first author, 194 total, H# = 38, Max cite = 2522, Max cite (first author) = 119

1. Drouin, B.J., Nemchick, D.J., Nole, A., Tang, A., Wu, C-T.M., Khiabani, N., Alonso, M., Chang, M-C.F., "Dual-band Fourier-transform millimeter wave spectrometry for *in-situ* gas sensing" *Planetary Science Journal*, 4(6) 2023.
2. Drouin, B.J., Kahn, B.H., Lim, B., Merrelli, A., Nelson, E., Quinn, G., Nagle, F., L'Ecuyer, T., "Orbital Trade Study for the PREFIRE Mission", *Aerospace Conference*, 2022 IEEE, 2.0108_2312
3. Drouin, B.J., "Practical uses of SPFIT", *J. Molec. Spectrosc.* 340, 1-15, 2017.
4. Drouin, B.J., Crawford, T.J., Yu, S., "Validation of ozone intensities at 10 μm with THz spectrometry", *J. Quant. Spectrosc. Radiat. Trans.* 203 282-292, 2017.
5. Drouin, B.J., A. Tang, E. Schlecht, E, Brageot, Q.J. Gu, Y. Ye, R. Shu, M.C.F Change and Y. Kim, "A CMOS millimeter-wave transceiver embedded in a semi-confocal Fabry-Perot cavity for molecular spectroscopy", *J. Chem. Phys.* 145(7) 074201, 2016.
6. Drouin, B.J., D.C. Benner, L.R. Brown, M.J. Cich, T.J. Crawford, V.M. Devi, A. Guillaume, J.T. Hodges, E.J. Mlawer, D.J. Robichaud, F. Oyafuso, V. J. Payne, K. Sung, E.H. Wishnow, S. Yu, "Multispectrum analysis of the Oxygen A-band." *J. Quant. Spectrosc. & Radiat. Trans.* 186, 118-138, 2017.
7. Drouin, B.J., V. Payne, F. Oyafuso, K. Sung, E. Mlawer, "Pressure broadening of oxygen by water", *J. Quant. Spectrosc. & Radiat. Trans.*, 133 190-198 2014.
8. Drouin, B.J., S. Yu, B. M. Elliott, T. J. Crawford, C. E. Miller, "High resolution spectral analysis of oxygen. III. Laboratory investigation of the airglow bands", *J. Chem. Phys.* 139, 144301, 2013.
9. Drouin B.J., J.C. Pearson, S. Yu, H. Gupta "Characterization and use of a 1.3-1.5 THz multiplier chain for molecular spectroscopy." (invited paper) *IEEE-TST* 3(3) 314-321, 2013.
10. Drouin B.J. "Isotopic Spectra of the Hydroxyl Radical" J. Phys. Chem. A 117(39) 10076-10091, 2013.
11. Drouin, B.J., L. Wiesenfeld, "Low-Temperature water-hydrogen-molecule collisions probed by pressure broadening and line shift", *Phys. Rev. A* 86, 022705, 2012.
12. Drouin, B.J., H. Gupta, S. Yu, C.E. Miller, H.S.P. Mueller, "High resolution spectral analysis of oxygen. II. Rotation al spectra of $^1\Delta_g$ O_2 isotopologues", *J. Chem. Phys.* 136, 024305, 2012.
13. Drouin, B.J., K. Cooper, R. Dengler, M. Chavez, W. Chun, T. Crawford. "Submillimeter wave spectrometry for in-situ planetary science" *Aerospace Conference*, 2012 IEEE, 1-4, 2012
14. Drouin B.J., S. Yu, J. C. Pearson, H. Gupta, "Terahertz Spectroscopy for Space Applications, 2.5-2.7: THz Spectra of HD, H_2O and NH_3" *Journal of Molecular Structure* Special Issue on THz Spectroscopy, 1006, 2-12, 2011.
15. Drouin B.J., S. Yu, "Acetylene Spectra near 2.6 THz" *Journal of Molecular Spectroscopy* 269(2), 254-256, 2011.
16. Drouin B.J., J.C. Pearson, M.J. Dick, Reply to "Comment on 'Collisional cooling investigation of THz rotational transitions of water'" *Physical Review* A, 82(3) 036704, 2010.
17. Drouin B.J., S. Yu, C.E. Miller, H.S.P. Mueller, F. Lewen, S.Bruenken, H. Habara, "Terahertz spectroscopy of oxygen,O_2, $^3\Sigma_g$ and $^1\Delta$ electronic states", *Journal of Quantitative Spectroscopy and Radiative Transfer*, 111, 1167–1173, 2010.
18. Drouin B.J., S. Yu, J.C. Pearson, H.S.P. Mueller, "High resolution spectroscopy of CH_3D and $^{13}CH_3D$", *Journal of Quantitative Spectroscopy and Radiative Transfer* 110(18) 2077-2081, 2009.
19. Drouin, B.J., R. R. Gamache, "Temperature Dependent Air Broadened Linewidths of Ozone Rotational Transitions" *Journal of Molecular Spectroscopy*, 251(1-2), 1-3, 2008.
20. Drouin B.J., K. Cooper, R.A. Stachnik, J.C. Pearson. "Submillimeter wave spectroscopy and the search for life on planets." Infrared, Millimeter and Terahertz Waves, 2008. IRMMW-THz 2008. 33rd International Conference on, 1-3, 2008.
21. Drouin, B.J., "Temperature dependent pressure induced linewidths of O_2 and $^{18}O^{16}O$ transitions in nitrogen, oxygen and air", *Journal of Quantitative Spectroscopy and Radiative Transfer*, 105 (3): 450-458, 2007.

22. Drouin, B.J., "Submillimeter measurements of N_2 and air broadening of hypochlorous acid," *Journal of Quantitative Spectroscopy and Radiative Transfer*, 103 (3): 558-564, 2007.
23. Drouin, B.J., J. C. Pearson, A. Walters, V. Lattanzi "THz Measurements of Propane" *Journal of Molecular Spectroscopy*, 240 (2): 227-237, 2006.
24. Drouin, B. J., F.W. Maiwald, "Extended THz measurements of nitrous oxide, N_2O," *Journal of Molecular Spectroscopy*, 236 (2): 260-262, 2006.
25. Drouin, B. J., C. E. Miller, J. L. Fry, D. T. Petkie, P. Helminger, I. Medvedev, "Submillimeter measurements of isotopes of nitric acid," *Journal of Molecular Spectroscopy*, 236 (1): 29-34, 2006.
26. Drouin B. J., F.W. Maiwald, J. C. Pearson, "Application of cascaded frequency multiplication to molecular spectroscopy," *Review of Scientific Instruments*, 76 (9): Art. No. 093113, 2005.
27. Drouin B.J., J. L. Fry, C. E. Miller, "Rotational spectrum of cis-cis HOONO", *Journal of Chemical Physics*, 120 (12): 5505-5508, 2004.
28. Drouin B.J., "Temperature dependent pressure-induced lineshape of the HCl $J = 1 \leftarrow 0$ rotational transition in nitrogen and oxygen", *Journal of Quantitative Spectroscopy and Radiative Transfer*, 83 (3-4): 321-331, 2004.
29. Drouin B.J., J. Fischer, R. R. Gamache, "Temperature dependent pressure induced lineshape of O_3 rotational transitions in air", *Journal of Quantitative Spectroscopy and Radiative Transfer*, 83 (1): 63-81, 2004.
30. Drouin B.J., C. E. Miller and E. A. Cohen, "Further investigations of the submillimeter spectrum of ClO", *Journal of Molecular Spectroscopy*, 207(1), 4-9, 2001.
31. Drouin B.J., C. E. Miller, H. S. P. Muller and E. A. Cohen, "The rotational spectra, isotopically independent parameters, and interatomic potentials for the $X_1\ ^2\Pi_{3/2}$ and $X_2\ ^2\Pi_{1/2}$ states of BrO", *Journal of Molecular Spectroscopy*, 205(1), 128-138, 2001.
32. Drouin B.J., J. J. Dannemiller and S. G. Kukolich, "Structural characterization of 'syn' and 'anti' -allyltricarbonylbromide, analyses of rotational spectra, quadrupole coupling and density functional calculations", *Inorganic Chemistry*, 39(4), 827-835, 2000.
33. Drouin B.J., J. J. Dannemiller and S. G. Kukolich, "The gas-phase structure of chloroferrocene from microwave spectra", *Journal of Chemical Physics*, 112(2), 747-751, 2000.
34. Drouin B.J. and S. G. Kukolich, "Microwave spectra and the molecular structure of tetracarbonylethyleneiron", *Journal of the American Chemical Society*, 121(16), 4023-4030, 1999.
35. Drouin B.J. P.A. Cassak and S. G. Kukolich, "Microwave measurements of rhenium quadrupole coupling in cyclopentadienyl rhenium tricarbonyl", *Journal of Chemical Physics*, 108(21), 8878-8883, 1998.
36. Drouin B.J. S.G. Kukolich, "Molecular structure of tetracarbonyldihydroiron: Microwave measurements and density functional theory calculations", *Journal of the American Chemical Society*, 120(27), 6774-6780, 1998.
37. Drouin B.J. N. E. Gruhn, J. F. Madden, S.G. Kukolich, M. Barfield, R.S. Glass, "Gas-phase conformational analysis of 1,4,7-trithiacyclononane", *Journal of Physical Chemistry A*, 101(48), 9180-9184, 1997.
38. Drouin B.J. T. G. Lavaty, P. A. Cassak , S.G. Kukolich "Measurements of structural and quadrupole coupling parameters for bromoferrocene using microwave spectroscopy", *Journal of Chemical Physics*, 107(17) 6541-6548, 1997.
39. Drouin B.J. P. A. Cassak, P. M. Briggs, S.G. Kukolich "Determination of structural parameters for the half-sandwich compounds cyclopentadienyl thallium and cyclopentadienyl indium and indium quadrupole coupling for cyclopentadienyl indium using microwave spectroscopy", *Journal of Chemical Physics*, 107(10), 3766-3773, 1997.
40. Drouin B.J. P. A. Cassak, S. G. Kukolich, "Measurements of structural and quadrupolar coupling parameters for chloroferrocene using microwave spectroscopy", *Inorganic Chemistry*, 36(13), 2868-2871, 1997.

Brian Drouin - Peer-reviewed Non-first Author Publications

41. Taylor, T.E., O'Dell, C.W., Baker, D., Bruegge, C., Chang, A., Chapsky, L., Chatterjee, A., Cheng, C., Chevallier, F., Crisp, D., Dang, L., Drouin, B., Eldering, A., Feng, L., Fisher, B., Fu, D.J., Gunson, M., Haemmerle, V., Keller, G.R., Kiel, M., Kuai, L., Kurosu, T., Lambert, A., Laughner, J., Lee, R., Liu, J.J., Mandrake, L., Marchetti, Y., McGarragh, G., Merrelli, A., Nelson, R.R., Osterman, G., Oyafuso, F., Palmer, P.I., Payne, V.H., Rosenberg, R., Somkuti, P., Spiers, G., To, C., Weir, B., Wennberg, P.O.,Yu, S.S., Zong, J. "Evaluating the consistency between OCO-2 and OCO-3 XCO2 estimates derived from the NASA ACOS version 10 retrieval algorithm", *Atmos. Meas. Tech.* 16(12), 3172-3209, 2023
42. Miller, N.B., Merrelli, A., L'Ecuyer, T.S., Drouin, B.J., "Simulated Clear-Sky Water Vapor and Temperature Retrievals from PREFIRE Measurements", *J. Atmos. Ocean. Tech.* 40(6), 645-659, 2023.
43. Xie, Y., Huang. X., Chen, X., L'Ecuyer, T.S., Drouin, B.J., "Joint Use of Far-Infrared and Mid-Infrared Observation for Sounding Retrievals: Learning from the Past for Upcoming Far-Infrared Missions" *Earth and Space Science*, in review, Jan 2023.
44. Sung, K.Y., Wishnow, E.H., Drouin, B.J., Manceron, L., Verseils, M., Benner, D.C., Nixon, C.A., "The rotational spectrum of HD broadened by H_2 at temperatures between 100-296 K" *J. Quant. Spectrosc. & Radiat. Trans.* 295, 108412, 2023. 10.1016.j.jqsrt.2022.108412
45. Xie, Y., Huang, X.L., Chen, X.H., L'Ecuyer T.S., Drouin, B.J., Wang, J., " Retrieval of Surface Spectral Emissivity in Polar Regions Based on the Optimal Estimation Method", *J. Geophys. Res. Atmos.* 127(5) e2021JD035677, 2022. DOI10.1029/2021JD035677
46. Nemchick, D.J., Hakopian, H., Drouin, B.J., Tang, A.J., Alonso-delPino, M., Chattopadhyay, G., Chang M-C. F., "180-GHz pulsed CMOS transmitter for molecular sensing", *IEEE Trans. THz Sci. & Tech.* 469-476, 11(5), 2021.
47. Gordon, I., Rothman L.R., *et al.* "The HITRAN2020 molecular spectroscopic database", *J. Quant. Spectrosc. & Radiat. Trans.* 277, 107949, 2021. 10.1016.j.jqsrt.2021.107949
48. Cole, R.K., Hoghooghi, N., Drouin, B.J., Rieker, G.B., "High-temperature absorption line shape parameters for CO_2 in the 6800-7000 cm^{-1} region from dual frequency comb measurements up to 1000 K", *J. Quant. Spectrosc. & Radiat. Trans.* 276, 107912, 2021. 10.1016/j.jqsrt.2021.107912
49. Reed, Z.D., Drouin, B.J., Hodges J.T., "Inclusion of the recoil shift in Doppler-broadened measurements of CO_2 transition frequencies," *J. Quant. Spectrosc. & Radiat. Trans.* 275, 107885, 2021.
50. Malarich, N.A., D. Yun, K. Sung, S. Egbert, S.C. Coburn, B.J. Drouin, G.B. Rieker, "Dual frequency comb absorption spectroscopy of CH_4 up to 1000 Kelvin from 6770-7570 cm^{-1}", *J. Quant. Spectrosc. & Radiat. Trans.* 272, 107812, 2021. 10.1016/j.jqsrt.2021.107812
51. Reed, Z., Drouin, B.J., Long, D.A., Hodges, J. T., "Molecular transition frequencies of CO_2 near 1.6 µm with kHz-level uncertainties," *J. Quant. Spectrosc. & Radiat. Trans.* 271, 107681, 2021.
52. L'Ecuyer, T.S., Drouin, B.J., Anheuser, J., Grames M., Henderson, D., Huang, X., Kahn, B.H., Kay, J.E., Lim, B.H., Mateling, M., Merrelli, A., Miller, N.B., Padmanabhan, S., Peterson, C., Schlegel, N.-J., White, M.L., Xie, Y., "The Polar Radiant Energy in the Far-InfraRed Experiment: A New Perspective on Polar longwave Energy Exchanges," *Bulletin of the American Meteorological Society (BAMS*), 102(7), E1431-E1449, 2021.
53. Mueller, H.S.P., Belloche, A., Lewen, F., Drouin, B.J., Sung, K., Garrod R.T., Menten K.M., "Toward a global model of the interactions in low-lying states of methyl cyanide: rotational and rovibrational spectroscopy of the $\nu_4 = 1$ state and tentative detection of the $\nu_4 = \nu_8 = 1$ state in Sgr B2(N)," *J. Molec. Spectrosc*. 378, 111449, 2021.
54. Choi, M., Sander, S., Spurr, R.J.D., et al. "Aerosol profiling using radiometric and polarimetric spectral measurements in the O_2 near infrared bands: Estimation of information content and measurement uncertainties," *Remote Sensing of the Environment* 253(112179), 2021.
55. Cooper, K. B., Roy, R.J. Siles, J., Lebsock, M., Millan, L., Rodriguez-Monje, R., Dengler, R., Pradhan, O., Tamppari, L, Drouin, B., "Millimeter- and Submillimeter-wave Differential Absorption Radar", *2020 17th European Radar Conference (EuRAD)*, 2021.
56. Pearson, J.C., Drouin, B.J., Yu. S., "Instrumentation for THz Spectroscopy in the Laboratory and in Space*", IEEE Journal of Microwaves*, Vol. 1, Iss. 1, 2021 (invited paper to inaugural journal issue)

57. Kahn, B. H.; Drouin, B. J.; L'Ecuyer, T. S. "Assessment of Sampling Sufficiency for Low-Cost Satellite Missions: Application to PREFIRE" *J. Atmos. Oc. Tech.* 37(12), 2283-2298, 2020, 10.1175/JTECH-D-20-0023.1
58. Pradhan, O., Cooper, K., Tamppari L., Drouin, B., Monje, R., Roy, R., Siles, J., Cochrane, C., "Submillimeter Wave Differential Absorption Radar for Water Vapor Sounding in the Martian Atmosphere", *IGARS 2020 – 2020 IEEE International Geoscience and Remote Sensing Symposium, 2020*.
59. Albert, D., Antony B.K., et al., "A decade with VAMDC: results and ambitions," *Atoms*, 8(4) 76, 2020.
60. Hobbs, J.M., Drouin B.J., Oyafuso, F., Payne, V.H., Gunson, M.R., McDuffie J., Mlawer E.J., "Spectroscopic Uncertainty Impacts on OCO-2/3 retrievals of XCO_2," *J. Quant. Spectrosc. & Radiat. Trans.*, 257(107360), 2020.
61. Sung K., Devi, V.M., Benner, D.C., Drouin, B.J., Crawford, T.J., Mantz, A.W., Smith, M.A.H., "H_2-pressure broadening and frequency shifts of methane in the $\nu_2+\nu_3$ band measured in the temperature range between 80 and 370 K", *J. Quant. Spectrosc. & Radiat. Trans.*, 256(107264), 2020. 10.1016/j.jqsrt.2020.107264
62. Payne, V., Drouin, B.J., Oyafuso, F., Kuai, L., Fisher, B., Sung, K., Nemchick, D., Crawford, T., Smyth, M., Crisp,. D., Adkins, E., Hodges, J., Long, D., Mlawer, E., Merrelli, A., Lunny, E., O'Dell, C., "Absorption Coefficient (ABSCO) tables for the Orbiting Carbon Observatories: Version 5.1," *J. Quant. Spectrosc. & Radiat. Trans.*, 2020, 255, 107217, 2020. 10.1016/j/jqsrt.2020.107217
63. Furtenbacher, T., Coles, P.A., Tennyson, J., Yurchenki, S.N., Yu, SS., Drouin, B., Tobias, R., Csaszar, A.G., "Empirical rovibrational energy levels of ammonia up to 7500 cm^{-1}," *J. Quant. Spectrosc. & Radiat. Trans.*, 251, 107027, 2020, 10.1016/j/jqsrt.2020.107027.
64. Raymond, Alexander W., Lee, K.L.K, McCarthy, M.C., Drouin B.J., Mazur, E. "Detecting Laser-Volatilized Salts with a Miniature 100-GHz Spectrometer" *J. Phys. Chem. A*, 124(7) 1429-1436, 2020.
65. Wang X.X., Korth B.A., Weigel, P.O., Nemchick, D.J., Drouin, B.J., Becker, W., Zhao, Q.Y., Zhu, D., Colangelo, M., Dane, A.E., Berggren, K.K., Shaw, M.D., Mookherjea, S.,. "Oscilliscopic Capture of Greater-Than-100 GHz, Ultra-Low Power Optical Waveforms Enable by Integrated Electrooptic Devices.", *J. Lightwave Tech.*, 38(1) 166-173, 2020.
66. Bray, C., Cuisset, A., Hindle, F., Bocquet, R., Mouret, G., Drouin, B.J., "CH_3D photomixing spectroscopy up to 2.5 THz: new set of rotational and dipole parameters, first THz self-broadening measurements (vol 189, pg 198, 2017)", *J. Quant. Spectrosc. & Radiat. Trans.*, 241, Correction, 2020.
67. Sung, K., Wishnow, E.H., Crawford, T.J., Nemchick, D., Drouin, B.J., Toon, G.C., Yu, S., Payne, V.H., Jiang, J.H., "FTS measurements of O_2 collision-induced absorption in the 565-700 nm region using a high pressure gas absorption cell." *J. Quant. Spectrosc. & Radiat. Trans.*, 235, 232-243, 2019.
68. Padmanabhan, S., Drouin, B., L'Ecuyer T., White, M., Lim. B., Kenyon, M., Mariani, G., McGuire J., Raouf, N., De Santos, O., Bendig, R., "The Polar Radiant Energy in the Far-InfraRed Experiment (PREFIRE)," *IGARSS 2019 – 2019 IEEE International Geoscience and Remote Sensing Symposium*
69. Ilyushin, V., Armieieva, I., Dorovskaya, O., Krapivin, I., Alekseev, E., Tudorie, M., Motienko, R.A., Margules, L., Pirali, O., Bekhtereva, E.S., Bauerecker, S., Maul, C., Sydow, C., Drouin, B.J., "The torsional fundamental band and high-J rotational spectra of the ground, first and second excited torsional states of acetone.", *J. Molec. Spectrosc.* 363, 111169, 2019.
70. Karman, T., Gordon, I.E., van der Avoird, A., Baranov, Y.I., Boulet, C., Drouin B.J., Groenenboom, G.C., Gustafsson, M., Hartmann, J.M., Kurucz, R.L., Rothman, L.R., Sun, K., Sung, K., Thalman, R., Tran, H., Wishnow, E.H., Wordsworth, R., Vigasin, A.A., Volkamer, R., van der Zande, W.J., "Update of the HITRAN collision-induced absorption section.", *Icarus*, 328, 160-175, 2019.
71. Mariani, G., Kenyon, M., Eom, Byeong, Drouin, B., White, M., "Far-Infrared Room-Temperature Focal Plane Modules for Polar Radiant Energy in the Far InfraRed Experiment," *2019 44th International Conference on Infrared, Millimeter and Terahertz Waves (IRMMW-THz)*.
72. Hodges, J.T., Viallon, J., Brewer, P.J., Drouin, B.J., Gorshelev, V., Janssen, C., Lee, S., Possolo, A., Smith, M.A.H., Walden, J., Wielgosz, R.I., "Recommendation of a consensus value of the ozone absorption cross-section at 253.65 nm based on a literature review." *Metrologia*, 56(3), 034001, 2019.

73. Kim, Y., Zhang, Y., Reck, T.J., Nemchick, D.J., Chattopadhyay, G., Drouin. B., Chang, M.C.F., Tang. A., "A 183-GHz InP/CMOS-Hybrid Heterodyne-Spectrometer for Spaceborne Atmospheric Remote Sensing." *IEEE Tran. THz Sci. & Tech.*, 9(3) 313-334, 2019.
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