Ben M. Elliott

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OBJECTIVE A position at a Research/Research and Development facility in instrumentation and instrument design with an emphasis on field and remote sensing applications.

EXPERIENCE

2013-Pres. *NASA; Jet Propulsion Laboratory*
NASA Postdoctoral Program Fellow

2012 *University of California, Los Angeles*
Staff Research Associate - Geochemistry

2010-2012 *University of California, Los Angeles*
Staff Research Associate - Chemistry

2005-2010 *Yale University*
Ph.D. Thesis Research

2004/2003 *Pacific Northwest National Laboratory*
Summer Internship

2003-2005 *Utah State University*
M.S. Thesis Research

2001-2003 *Utah State University*
Undergraduate Research

EXPERTISE

◊ Solid-State Laser Systems
- Nd:YAG
- OPO/OPA
- Ultrafast Ti:Sapphire

◊ Spectroscopic instrumentation
- Photoelectron imaging
- High-Vacuum Technology
- Linear and Non-linear optics

◊ Spectroscopy
- Photoelectron
- Vibrational Predissociation
- Fourier Transform

◊ Mass Spectrometry
- Time-Of-Flight
- Magnetic Sector

◊ Experimental design
- CAD rendering
- Machining

◊ Physical Chemistry/ Chemical Physics

EDUCATION

2010 Doctor of Philosophy: Physical Chemistry, *Yale University, New Haven, CT*
2008 Master of Science: Physical Chemistry, *Yale University, New Haven, CT*
2005 Master of Science: Physical Chemistry, *Utah State University, Logan, UT*
2003 Bachelor of Science: Chemistry, *Utah State University, Logan, UT*

REFERENCES

Charles E. Miller
NASA, Jet Propulsion Laboratory
California Institute of Technology
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RESEARCH EXPERIENCE

2013-Pres. NASA/ORAU, Jet Propulsion Laboratory
NASA Postdoctoral Program Fellow
Advisor: Dr. Charles E. Miller
High-resolution infrared *Fourier Transform Spectroscopy* of the isotopologues of carbon dioxide for application to remote sensing retrievals of planetary atmospheres

2012 UCLA; Staff Research Associate
PI: Prof. Aradhna Tripati
Laboratory Manager in Geochemistry: design, construction, repair, and maintenance of *Vacuum Apparatus and Magnetic Sector Mass Spectrometer* for research into paleoclimate reconstruction

2010-2012 UCLA; Staff Research Associate
PI: Prof. Benjamin J. Schwartz
Ultrafast Laser Spectroscopy: maintenance, and repair of *Ultrafast Ti:Sapphire* laser system, and design and construction of a *pump-gate fluorescence spectroscopy* experimental system

2005-2010 Yale University; Ph.D. Thesis Research
Advisor: Prof. Mark A. Johnson
Vibrational Predissociation Spectroscopy: *Time-Of-Flight Mass Spectrometry* and infrared laser vibrational and photoelectron studies of gas-phase solvated ion clusters; design and modification of mass spectrometry apparatus and components, of *solid-state tunable infrared laser systems (OPO/OPA), and of Photoelectron Imaging apparatus*

2003-2005 Utah State University; M.S. Thesis Research
Advisor: Prof. Alexander I. Boldyrev
Electronic structure calculations of gas-phase, high-oxygen-density clusters; *Gaussian and Molpro* quantum chemical calculation packages

2004 Pacific Northwest National Laboratory; Summer Internship
Advisor: Prof. Lai-Sheng Wang
Electronic structure calculations of small, gas-phase iron-sulfur cluster ions; NWChem and ADF quantum chemical calculation packages

2003 Pacific Northwest National Laboratory; Summer Research Institute Fellow
Advisor: Prof. Lai-Sheng Wang
Electronic structure calculations of small, gas-phase iron-sulfur cluster ions; *NWChem and ADF* quantum chemical calculation packages

2001-2003 Utah State University; Undergraduate Research
Advisor: Prof. Alexander I. Boldyrev
Electronic structure calculations of small gas-phase cluster ions; *Gaussian and Molpro* quantum chemical calculation packages

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EDUCATION

2010 Ph.D. Physical Chemistry/Chemical Physics
Yale University, Department of Chemistry
Advisor: Prof. Mark A. Johnson

2008 M.S. Chemical Physics
Yale University, Department of Chemistry
Advisor: Prof. Mark A. Johnson

2005 M.S. Theoretical Physical Chemistry
Utah State University, Department of Chemistry and Biochemistry
Advisor: Prof. Alexander I. Boldyrev

2003 B.S. Major: Chemistry; Minor: Latin
Utah State University

HONORS AND AWARDS

2012 NASA Postdoctoral Program Fellowship administered by Oak Ridge Associated Universities conducted at The Jet Propulsion Laboratory

2004 Summer Research Institute Fellowship in Interfacial and Condensed Phase Chemical Physics, Pacific Northwest National Laboratory

2004 Utah State University Maeser-Bauer Graduate Teaching Assistant Award

2004 Utah State University Chemistry and Biochemistry Alumni Award

2003 Summer Research Institute Fellowship in Interfacial and Condensed Phase Chemical Physics, Pacific Northwest National Laboratory

SKILLS AND LANGUAGES

Programming Python; Matlab

Scientific Software OriginPro; Gaussian; MolPro; SPFIT/SPCAT

CAD/3-D Design SketchUp; AutoDesk; Blender

Instrument Const. Machining; High-vacuum Pumps and Apparatus; Optical setups; High-Voltage Pulsed Electronics

Laser Systems Nd:YAG; OPO/OPA; Ti:Sapphire Regenerative Amplifier

Experimentation Photoelectron Imaging Spectroscopy; Fourier Transform Spectroscopy; IR Laser Induced Dissociation Spectroscopy; Time-Of-Flight and Magnetic Sector Mass Spectrometry

Languages English (Native)
Russian (Speaking: Fluent; Reading/Writing: Limited working proficiency)
Spanish (Reading/Writing: Limited working proficiency)

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PUBLICATIONS

18. Elliott, B.M.; Sung, K.; Miller, C.E. "FT-IR Spectra of ^{18}O-, and ^{13}C-Enriched CO_2 in the ν_3 Region: High Accuracy Frequency Calibration and Spectroscopic Constants for $^{16}O^{12}C^{18}O$, $^{18}O^{12}C^{18}O$, and $^{16}O^{13}C^{16}O$" *J. Mol. Spectrosc.* in preparation

17. Elliott, B.M.; Sung, K.; Miller, C.E. "FT-IR spectra of ^{17}O-enriched CO_2 in the ν_3 region: High accuracy frequency calibration and spectroscopic constants for $^{16}O^{12}C^{17}O$, $^{17}O^{12}C^{17}O$, and $^{17}O^{12}C^{18}O$" *J. Mol. Spectrosc.* **2014**, *in press.*

16. Drouin, B.J.; Yu, S.S.; Elliott, B.M.; Crawford, T.J.; Miller, C.E. "High resolution spectral analysis of oxygen. III. Laboratory investigation of the airglow bands" *J. Chem. Phys* **2013**, *139*, 144301

15. Guasco, T. L.; Elliott, B. M.; Johnson, M. A.; Ding, J.; Jordan, K. D. "Isolating the Spectral Signatures of Individual Sites in Water Networks Using Vibrational Double-Resonance Spectroscopy of Cluster Isotopomers" *J. Phys. Chem. Lett.*, **2010**, *1*, 2396–2401

14. Horvath, S.; McCoy, A. B.; Elliott, B. M.; Weddle, G. H.; Roscioli, J. R.; Johnson, M. A. "Anharmonicities and isotopic effects in the vibrational spectra of $X^-{\cdot}H_2O$, $\cdot HDO$, and $\cdot D_2O$ [X = Cl, Br, and I] binary complexes" *J. Phys. Chem. A*, **2010**, *114 (3)*, 1556-1568

13. Relph, R. A.; Guasco, T. L.; Elliott, B. M.; Kamrath, M. Z.; McCoy, A. B.; Steele, R. P.; Schofield, D. P.; Jordan, K. D.; Viggiano, A. A.; Ferguson, E. E.; Johnson, M. A. "How the shape of an H-bonded network controls proton-coupled water activation in HONO formation" *Science*, **2010**, *327*, 308-312

12. Bopp, J. C.; Alexandrova, A. N.; Elliott, B. M.; Herden, T.; Johnson, M. A. "Vibrational predissociation spectra of the O_n^-, n = 3 - 10, 12 clusters: Even-odd alternation in the core ion" *Int. J. Mass Spectrom.*, **2009**, *283*, 94–99

11. Relph, R. A.; Elliott, B. M.; Weddle, G. H.; Johnson, M. A.; Ding, J.; Jordan, K. D. "Vibrationally-induced interconversion of H-bonded $NO_2^- \cdot H_2O$ isomers within $NO_2^- \cdot H_2O \cdot Ar_m$ clusters using IR-IR pump-probe through the OH and NO stretching vibrations" *J. Phys. Chem. A.*, **2009**, *113 (6)*, 975-981

10. Elliott, B. M.; McCunn, L. R.; Johnson, M. A. "Photoelectron imaging study of vibrationally mediated electron autodetachment in the type I isomer of the water hexamer anion" *Chem. Phys. Lett.*, **2008**, *467*, 32-36

9. Elliott, B. M.; Relph, R. A.; Roscioli, J. R.; Bopp, J. C.; Gardenier, G. H.; Guasco, T. L.; Johnson, M. A. "Isolating the spectra of cluster ion isomers using Ar-"tag"-mediated IR-IR double resonance within the vibrational manifolds: Application to $NO_2^- \cdot H_2O$" *J. Chem. Phys* **2008**, *129*, 094303

8. McCunn, L. R.; Gardenier, G. H.; Guasco, T. L.; Elliott, B. M.; Bopp, J. C.; Relph, R. A.; Johnson, M. A. "Probing isomer interconversion in anionic water clusters

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using an Ar-mediated pump-probe approach: Combining vibrational predissociation and velocity-map photoelectron imaging spectroscopies" *J. Chem. Phys.* **2008**, *128(23)*, 234311

7. McCunn, L. R; Roscioli, J. R; Elliott, B. M; Johnson, M. A.; McCoy, A. B. "Why does argon bind to deuterium? Isotope effects and structures of Ar · $H_5O_2^+$ complexes" *J. Phys. Chem. A* **2008**, *112(27)*, 6074

6. Elliott, B. M.; Koyle, E.; Boldyrev, A. I.; Wang, X.-B.; Wang, L.-S. "MX_3^- Superhalogens (M = Be, Mg, Ca; X = Cl, Br): A Photoelectron Spectroscopic and ab Initio Theoretical Study" *J. Phys. Chem. A* **2005**, *109(50)*, 11560-11567

5. Elliott, B. M.; Boldyrev, A. I. "The oxygen-rich carboxide series: CO_n (n = 3, 4, 5, 6, 7, or 8)" *J. Phys. Chem. A* **2005**, *109(16)*, 3722

4. Elliott, B. M.; Boldyrev, A. I. "*Ab initio* probing of the aromatic oxygen cluster O_4^{2+}" *J. Phys. Chem. A* **2005**, *109(1)*, 236

3. Elliott, B. M.; Boldyrev, A. I. "Ozonic acid and its ionic salts: *ab initio* probing of the O_4^{2-}" dianion *Inorg. Chem.* **2004**, *43(14)*, 4109

2. Elliott, B. M.; Alexandrova, A. N.; Boldyrev, A. I. "Hydrogen trioxide anion: a possible atmospheric intermediate and path to oxygen-rich molecules" *J. Phys. Chem. A* **2003**, *107(8)*, 1203

1. Zhai, H.-Jin; Yang, X.; Wang, X.-B.; Wang, L.-S.; Elliott, B. M.; Boldyrev, A. I. "In search of covalently bound tetra- and penta-oxygen species: a photoelectron spectroscopic and *ab initio* investigation of MO_4^- and MO_5^- (M = Li, Na, K, Cs)" *J. Am. Chem. Soc.* **2002**, *124(23)*, 6742

PRESENTATIONS

20. (Oral) Elliott, B. M.; Sung, K.; Miller, C. E. "FTS Studies Of The Isotopologues Of CO_2 Toward Creating A Complete And Highly Accurate Reference Standard" **2014**, The 23rd International Conference on High Resolution Molecular Spectroscopy, Bologna, Italy

19. (Poster) Elliott, B. M.; Sung, K.; Miller, C. E. "Laboratory Spectroscopy Of Rare Isotope Enriched CO_2: Toward A Complete And Highly Accurate Global Frequency Reference Standard" **2014**, Postdoc Research Day, Pasadena, CA

18. (Poster) Elliott, B. M.; Sung, K.; Miller, C. E. "FTS Studies Of The Isotopologues Of CO_2 Toward Creating A Complete And Highly Accurate Reference Standard" **2014**, 13th Biennial HITRAN Conference, Cambridge, MA

17. (Oral) Elliott, B. M.; Sung, K.; Miller, C. E. "FTS Studies Of The Isotopologues Of CO_2 Toward Creating A Complete And Highly Accurate Reference Standard" **2014**, 69th International Symposium on Molecular Spectroscopy, Columbus, OH

16. (Oral) Elliott, B. M.; Miller, C. E.; Sung, K.; Brown, L. "A High Accuracy FTS Vibrational Study And A Global Fit For ^{17}O Enriched CO_2" **2014**, Pacific

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Conference on Spectroscopy and Dynamics, Pacific Grove, CA

15. (Oral) Elliott, B. M.; Miller, C. E.; Sung, K.; Brown, L. "Absolute Position Calibration Of The ^{17}O Enriched Isotopologues of CO_2" **2014**, OCO-2 Science Team Meeting, Pasadena, CA

14. (Oral) Elliott, B. M.; Miller, C. E.; Sung, K.; Jacquemart, D.; Brown, L. "A New Global Fit for ^{17}O Enriched CO_2" **2013**, 68th International Symposium on Molecular Spectroscopy, Columbus, OH

13. (Oral) Elliott, B. M.; Miller, C. E. "A New Global Fit for ^{17}O Enriched CO_2" **2013**, OCO-2 Science Team Meeting, Pasadena, CA

12. (Oral Invited/Poster) Elliott, B. M.; Relph, R. A.; Kamrath, M. Z.; Guasco, T. L.; Johnson, M. A.; Steele, R. P.; McCoy, A. B.; Ferguson, E. E.; Viggiano, A. A.; Schofield, D. P.; Jordan, K. D. "Water activation controlled by the shape of an H-bonded network" **2009**, XXII Dynamics of Molecular Collisions Meeting, Snowbird, UT

11. (Poster) Elliott, B. M.; Relph, R. A.; Weddle, G. H.; Johnson, M. A.; Ding, J.; Jordan, K. D. "Exploration Of Complex Potential Energy Landscapes Using Ar-Mediated Double Resonance Spectroscopy" **2009**, Gordon Research Conference on Molecular Energy Transfer, Ventura, CA

10. (Poster) Elliott, B. M.; Relph, R. A.; Roscioli, J. R.; Bopp, J. C.; Guasco, T. L.; Gardenier, G. G.; Johnson, M. A. "Experimental Exploration of Complex Potential Energy Landscapes Using Ar-Mediated Double Resonance Spectroscopy" **2008**, Bristol-Meyers-Squib Symposium, Yale University, New Haven, CT

9. (Oral) Elliott, B. M.; Johnson, M. A. "Photoelectron Imaging Of Negatively Charged Species" **2007**, Bristol-Meyers-Squib Symposium, Yale University, New Haven, CT

8. (Poster) Elliott, B. M.; Roscioli, J. R.; Bopp, J. C.; Headrick, J. M.; McCunn, L. R.; Hammer, N. I.; Johnson, M. A. "Isomer Selective Studies of Small Water Clusters" **2007**, Symposium on Size Selected Clusters, Brand, Austria

7. (Oral) Elliott, B. M. "The Ab Initio Search For Oxygen-Rich Molecules", **2005**, Physical Chemistry Student Seminar, Yale University, New Haven, CT

6. (Poster) Elliott, B. M.; Boldyrev, A. I.; Alexandrova, A. N.; Zhai, H.-J.; Yang, X.; Wang, X.-B.; Wang, L.-S. "Oxygen Rich Species: Areas of Growth and Advancement" **2005**, 229th ACS National Meeting, San Diego, CA

5. (Poster) Elliott, B. M.; Boldyrev, A. I.; Alexandrova, A. N.; Zhai, H.-J.; Yang, X.; Wang, X.-B.; Wang, L.-S. "Developments in the Search for Oxygen Rich Species" **2004**, Winter School 2004, Helsinki, Finland

4. (Poster) Elliott, B. M.; Boldyrev, A. I. **2004**, 85th Annual Meeting, AAAS, Pacific Divison, Logan, UT

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3. (Poster) Elliott, B. M.; Boldyrev, A. I. "Ozonic Acid and Ionic Salts of the O_4^{2-} Dianion" **2004**, Joint 59th Northwest and 18th Rocky Mountain Regional Meeting of the American Chemical Society, Logan, UT

2. (Poster) Elliott, B. M.; Boldyrev, A. I.; Alexandrova, A. N.; Zhai, H.-J.; Yang, X.; Wang, X.-B.; Wang, L.-S. "Designing Oxygen-Rich Species: Combining Ab Initio Calculations and Experiment" **2004**, 20th Austin Sumposium on Molecular Structure, Austin, TX

1. (Poster) Elliott, B. M.; Boldyrev, A. I. ; Zhai, H.-J.; Yang, X.; Wang, X.-B.; Wang, L.-S. "In Search of Covalently-Bound Tetra- and Penta-Oxygen Clusters" **2003**, 225th ACS Nat'l Meeting, New Orleans, LA