

Christopher G. Elles

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RESEARCH INTERESTS

Condensed-phase chemical reaction dynamics; Excited-state dynamics of photochromic molecular switches, photo-triggers, and photoactive materials; Ultrafast laser spectroscopy; Time-resolved x-ray spectroscopy

PROFESSIONAL EXPERIENCE

Program Director, National Science Foundation, *2020-present*
Associate Professor, University of Kansas, *2016-present*
Visiting Professor, University of Rome “La Sapienza”, *Summer 2012*
Assistant Professor, University of Kansas, *2009-2016*

EDUCATION

Postdoc, University of Southern California and Argonne National Laboratory (joint), *2004-2009*
Research Project: *Reaction mechanisms in the ionization of liquid water*
Advisors: Stephen E. Bradforth (USC) and Robert A. Crowell (ANL)
Ph.D., Chemistry, University of Wisconsin–Madison, *July 2004*
Dissertation: *Vibrational relaxation and photodissociation dynamics in solution*
Advisor: F. Fleming Crim
B.S., Chemistry, Colorado State University, *May 1999*
Research Project: *Characterization of non-aqueous and mixed-solute reverse micelles*
Advisor: Nancy E. Levinger

SELECTED AWARDS

Finalist, Honor for an Outstanding Progressive Educator (H.O.P.E.) Award, Univ. of Kansas, *2016*
J. Michael Young Academic Advisor Award, University of Kansas, *2016*
National Science Foundation CAREER Award, *2012-2017*
University of Rome Visiting Professorship, *2012*
Kansas NSF EPSCoR First Award, *2011*
Arthur Adamson Postdoctoral Award in Chemistry, University of Southern California, *2009*
Excellence in Physical Chemistry Research Award, University of Wisconsin, *2004*
Chemistry Undergraduate Research Award, Colorado State University, *1999*
Sigma Xi Grant-in-Aid of Research, *1998*

AFFILIATIONS

American Association for the Advancement of Science, *2004-present*
American Chemical Society, *1998-present*
Inter-American Photochemical Society, *2017-present*
Sigma Xi, *2020-present*

PUBLICATIONS

Based on work performed at KU:

36. C. J. Otolowski, A. Mohan Raj, V. Ramamurthy, and C. G. Elles, *Spatial confinement alters the ultrafast photoisomerization dynamics of azobenzenes*, *Chemical Science*, (in press, 2020).
DOI: 10.1039/D0SC03955A

35. K. H. Burns, P. Srivastava, and C. G. Elles, *Absolute Cross Sections of Liquids from Broadband Stimulated Raman Scattering with Femtosecond and Picosecond Pulses*, *Analytical Chemistry*, **92**, 10686 (2020).
34. M. S. Barclay, C. G. Elles, and M. Caricato, *On the discrepancy between experimental and calculated Raman intensities for conjugated phenyl and thiophene derivatives*, *Journal of Physical Chemistry A*, **124**, 4678 (2020).
33. W. C. Henke, C. J. Otolski, W. N. G. Moore, C. G. Elles, and J. D. Blakemore, *Ultrafast spectroscopy of $[Mn(CO)_3]$ complexes: Tuning the kinetics of light-driven CO release and solvent binding*, *Inorganic Chemistry*, **59**, 2178 (2020).
32. M. S. Barclay, C. G. Elles, and M. Caricato, *A benchmark study of ground-state Raman spectra in conjugated molecules*, *Journal of Chemical Theory and Computation*, **16**, 612 (2020).
31. S. Mahvidi, C. G. Elles, B. S. Hadavand, Y. Yokoyama, F. Nourmohammadian, *Influence of Protonation on the Photochromic Behavior, Phase Transfer and Thermal Stability of Phenylamine-Substituted Diarylethenes*, *Progress in Color, Colorants and Coatings*, **13**, 105 (2020).
30. M. S. Barclay, M. Caricato, and C. G. Elles, *Femtosecond stimulated Raman scattering from triplet electronic states: Experimental and theoretical study of resonance enhancements*, *Journal of Physical Chemistry A*, **123**, 7720 (2019).
29. D. Bhattacharyya, Y. Zhang, C. G. Elles, and S. E. Bradforth, *Electronic structure of liquid methanol and ethanol from polarization-dependent two-photon absorption spectroscopy*, *Journal of Physical Chemistry A*, **123**, 5789 (2019).
28. C. J. Otolski, A. Mohan Raj, G. Sharma, R. Prabhakar, V. Ramamurthy, and C. G. Elles, *Ultrafast trans \rightarrow cis photoisomerization dynamics of alkyl-substituted stilbenes in a supramolecular capsule*, *Journal of Physical Chemistry A*, **123**, 5061 (2019).
27. C. J. Otolski, A. Mohan Raj, V. Ramamurthy, and C. G. Elles, *Ultrafast dynamics of encapsulated molecules reveals new insight on the photoisomerization mechanism for azobenzenes*, *Journal of Physical Chemistry Letters*, **10**, 121 (2019).
26. T. J. Quincy, M. S. Barclay, M. Caricato, and C. G. Elles, *Probing dynamics in higher-lying electronic states with resonance-enhanced femtosecond stimulated Raman spectroscopy*, *Journal of Physical Chemistry A*, **122**, 8308 (2018).
25. M. S. Barclay, T. J. Quincy, D. B. Williams-Young, M. Caricato, and C. G. Elles, *Accurate assignments of excited-state resonance Raman spectra: A benchmark study combining experiment and theory*, *Journal of Physical Chemistry A*, **121**, 7937 (2017).
24. M. de Wergifosse, C. G. Elles, and A. I. Krylov, *Two-photon absorption spectroscopy of stilbene and phenanthrene: Excited-state analysis and comparison with ethylene and toluene*, *Journal of Chemical Physics*, **146**, 174102 (2017).
23. M. de Wergifosse, A. L. Houk, A. I. Krylov, and C. G. Elles, *Two-photon absorption spectroscopy of trans-stilbene, cis-stilbene, and phenanthrene: Theory and experiment*, *Journal of Chemical Physics*, **146**, 144305 (2017).
22. G. Batignani, E. Pontecorvo, C. Ferrante, M. Aschi, C. G. Elles, and T. Scopigno, *Visualizing excited-state dynamics of a diaryl thiophene: Femtosecond stimulated Raman scattering as a probe of conjugated molecules*, *Journal of Physical Chemistry Letters*, **7**, 2981 (2016).
21. A. L. Houk, R. S. Givens, and C. G. Elles, *Two-photon activation of p-hydroxyphenacyl phototriggers: Toward spatially controlled release of diethyl phosphate and ATP*, *Journal of Physical Chemistry B*, **120**, 3178 (2016).
20. A. L. Houk, I. L. Zheldakov, T. A. Tommey, and C. G. Elles, *Two-photon excitation of trans-stilbene: Spectroscopy and dynamics of electronically excited states above S_1* , *Journal of Physical Chemistry B*, **119**, 9335 (2015).
19. B. Langdon, J. Garlick, X. Ren, D. J. Wilson, A. M. Summers, S. Zigo, M. F. Kling, S. Lei, C. G. Elles, E. Wells, E. D. Poliakoff, K. D. Carnes, V. Kumarappan, I. Ben-Itzhak, and C. A. Trallero-Herrero, *A carrier-envelope-phase stabilized terawatt class laser at 1 kHz with a wavelength tunable option*, *Optics Express*, **23**, 4563 (2015).

18. C. L. Ward and C. G. Elles, *Cycloreversion dynamics of a photochromic molecular switch via one-photon and sequential two-photon excitation*, Journal of Physical Chemistry A, **118**, 10011 (2014).
17. E. Pontecorvo, C. Ferrante, C. G. Elles, and T. Scopigno, *Structural rearrangement accompanying the ultrafast electrocyclization reaction of a photochromic molecular switch*, Journal of Physical Chemistry B, **118**, 6915 (2014).
16. I. L. Zheldakov, O. Grinevich, A. Mejiritski, C. G. Elles, and D. C. Neckers, *Transient spectroscopy of 5,7-diiodo-3-butoxy-6-fluorone (DIBF)*, Photochemistry and Photobiology, **90**, 335 (2014).
15. L. Sarkany, J. M. Wasylenko, S. Roy, D. A. Higgins, C. G. Elles, and V. Chikan, *Investigation of fluorescence emission from CdSe nanorods in PMMA and P3HT/PMMA films*, Journal of Physical Chemistry C, **117**, 18818 (2013).
14. E. Pontecorvo, C. Ferrante, C. G. Elles, and T. Scopigno, *Optimally shaped narrowband pulses for femtosecond stimulated Raman spectroscopy in the range 330-750 nm*, Optics Express, **21**, 6866 (2013).
13. C. L. Ward and C. G. Elles, *Controlling the excited-state reaction dynamics of a photochromic molecular switch with sequential two-photon excitation*, Journal of Physical Chemistry Letters, **3**, 2995 (2012).
12. I. L. Zheldakov, J. M. Wasylenko, and C. G. Elles, *Excited-state dynamics and efficient triplet formation in phenylthiophene compounds*, Physical Chemistry Chemical Physics, **14**, 6211 (2012).

Prior to joining KU:

11. O. Marsálek, C. G. Elles, P. A. Pieniazek, Eva Pluhařová, J. Vande Vondele, S. E. Bradforth, and P. Jungwirth, *Chasing charge localization and chemical reactivity following photoionization in liquid water*, Journal of Chemical Physics, **135**, 224510 (2011).
10. C. G. Elles, C. A. Rivera, Y. Zhang, P. A. Pieniazek, and S. E. Bradforth, *Electronic structure of liquid water from polarization-dependent two-photon absorption spectroscopy*, Journal of Chemical Physics, **130**, 084501 (2009).
9. C. G. Elles, I. A. Shkrob, R. A. Crowell, D. A. Arms, and E. C. Landahl, *Transient x-ray absorption spectroscopy of hydrated halogen atom*, Journal of Chemical Physics, **128**, 061102 (2008).
8. C. G. Elles, I. A. Shkrob, R. A. Crowell, and S. E. Bradforth, *Excited state dynamics of liquid water: Insight from the dissociation reaction following two-photon excitation*, Journal of Chemical Physics, **126**, 164503 (2007).
7. C. G. Elles, A. E. Jailaubekov, R. A. Crowell, and S. E. Bradforth, *Excitation-energy dependence of the mechanism for two-photon ionization of liquid H₂O and D₂O from 8.3 to 12.4 eV*, Journal of Chemical Physics, **125**, 044515 (2006).
6. C. G. Elles and F. F. Crim, *Connecting chemical dynamics in gases and liquids*, Annual Review of Physical Chemistry, **57**, 273 (2006).
5. L. Sheps, A. C. Crowther, C. G. Elles, and F. F. Crim, *Recombination dynamics and hydrogen abstraction reactions of chlorine radicals in solution*, Journal of Physical Chemistry A, **109**, 4296 (2005).
4. C. G. Elles, M. J. Cox, G. L. Barnes, and F. F. Crim, *Recombination and reaction dynamics following photodissociation of CH₃OCl in solution*, Journal of Physical Chemistry A, **108**, 10973 (2004).
3. C. G. Elles, M. J. Cox, and F. F. Crim, *Vibrational relaxation of CH₃I in the gas phase and in solution*, Journal of Chemical Physics, **120**, 6973 (2004).
2. C. G. Elles, D. Bingemann, M. M. Heckscher, and F. F. Crim, *Vibrational relaxation of CH₂I₂ in solution: Excitation level dependence*, Journal of Chemical Physics, **118**, 5587 (2003).
1. C. G. Elles and N. E. Levinger, *Reverse micelles solubilizing DMSO and DMSO/water mixtures*, Chemical Physics Letters, **317**, 624 (2000).

Intl. Chemical Congress of Pacific Basin Societies (Pacifichem), Honolulu, HI (ppd. to Dec. 2021)
International Conference on Raman Spectroscopy (ICORS), Rome, Italy (postponed to August 2021)
Spectroscopy and Dynamics on Multiple Potential Energy Surfaces, Telluride, CO (July 2020-ppd.)
Department of Chemistry, University of Wisconsin– Oshkosh, Oshkosh, WI (March 2020)
Department of Chemistry, Ripon College, Ripon, WI (March 2020)
Advanced Photon Source, User Science Seminar, Argonne National Laboratory, Lemont, IL (Dec. 2019)
Department of Chemistry, Missouri University of Science and Technology, Rolla, MO (Nov. 2019)
19th Intl. Conference on Time-Resolved Vibrational Spectroscopy (TRVS), Auckland, NZ (Sept. 2019)
International Conference on Photochemistry, Boulder, CO (July 2019)
Chemistry and Dynamics in Complex Environments, Telluride, CO (June 2019)
Department of Physics and Astronomy Colloquium, University of Kansas, Lawrence, KS (Feb. 2019)
Pacific Conference on Spectroscopy and Dynamics, San Diego, CA (January 2019)
Department of Chemistry, University of Nebraska-Omaha, Omaha, NE (November 2018)
Department of Chemistry, University of Rochester, Rochester, NY (October 2018)
Gordon Research Conference on Molecular Interactions and Dynamics, Easton, MA (July 2018)
Department of Chemistry, University of Miami, Miami, FL (March 2018)
Center for Photochemical Sciences, Bowling Green State University, Bowling Green, OH (Feb. 2018)
27th Inter-American Photochemical Society (I-APS) Winter Meeting, Sarasota, FL (January 2018)
Chemistry and Dynamics in Complex Environments, Telluride, CO (June 2017)
72nd International Symposium on Molecular Spectroscopy, Champaign-Urbana, IL (June 2017)
Department of Science and Mathematics, Mid-America Nazarene University, Olathe, KS (April 2017)
253rd National Meeting of the American Chemical Society, San Francisco, CA (April 2017)
Ultrafast Dynamics of Atoms, Molecules, and Nanostructures, Manhattan, KS (March 2017)
Department of Physics, Kansas State University, Manhattan, KS (March 2017)
Department of Chemistry, Western Kentucky University, Bowling Green, KY (February 2017)
Department of Chemistry & Biochemistry, Montana State University, Bozeman, MT (October 2016)
Spectroscopy and Dynamics on Multiple Potential Energy Surfaces, Telluride, CO (July 2016)
Southwest Ultrafast Conference, University of Texas, Austin, TX (June 2016)
Modeling the Unseen in the Physical Sciences, Manhattan, KS (June 2016)

FUNDING AND RESEARCH SUPPORT

Ultrafast Dynamics of Highly Excited Molecules in the Condensed Phase. National Science Foundation, \$485,331 (PI), 2020-2023
TR-XAS study of structural changes in the photodecomposition of Mn CO₂ reduction catalysts. Advanced Photon Source General User Proposal, (PI), 15 shifts (120 hours) beamtime, Dec. 2019
Broadband two-photon absorption spectroscopy for high-repetition rate lasers. National Science Foundation, \$397,788 (PI), 2019-2022
Designer chromophores for therapeutic carbon monoxide release via two-photon photochemistry. Hall Research Fund (KU), \$38,000 (co-PI), 2018-2019
Time-resolved XAS study of the photo-degradation mechanism for manganese CO₂ reduction catalysts. Advanced Photon Source General User Proposal, (PI), 18 shifts (144 hours) beamtime, June 2018

Fast processes in optogenetic systems: Experiments and modeling. National Institutes of Health Center of Biomedical Research Excellence in Protein Structure and Function (COBRE-PSF), Pilot Grant (co-investigator), \$20,000, 2017-2018

Collaborative research: Imaging and controlling ultrafast dynamics of atoms, molecules, and nanostructures. National Science Foundation, RII Track 2, \$156,059 sub-award, 2014-2017

Ultrafast dynamics of organic and molecular electronics components. American Chemical Society Petroleum Research Fund, \$100,000 (PI), 2013-2016

Controlling non-adiabatic reaction dynamics in solution: A window on the fundamental details of chemical reactions. National Science Foundation CAREER Award, \$650,000 (PI), 2012-2017

Controlling non-adiabatic dynamics in solution: One- and two-photon excitation of photochromic molecular switches. Kansas NSF EPSCoR First Award, \$71,264 (PI), 2011-2012

RESEARCH MENTORING

Current Students:

Kristen H. Burns	5 th year Ph.D.
Daniel R. Johnson	4 th year Ph.D.
Prasenjit Srivastava	4 th year Ph.D.
Jess Bair	Undergraduate
Robert A. Castaneda	Undergraduate

Visiting Scholars:

Jordan Mantha, Associate Professor, Mid-America Nazarene University (2016-18)
Sadeh Mahvidi, Graduate Student, Institute for Color Science, Tehran, Iran (2016-17)

Former Graduate and Postdoctoral Students:

Matthew S. Barclay (Ph.D., December 2019)	Postdoc, Boise State University
David A. Stierwalt (M.S., August 2019)	Indianapolis, IN
Christopher J. Otolski (Ph.D., May 2019)	Postdoc, Argonne National Laboratory
Timothy J. Quincy (Ph.D., August 2018)	Asst. Prof., Lincoln Univ. (MO) <i>begin. Fall 2020</i>
Amanda L. (Staker) Houk (Ph.D., Oct. 2015)	Senior Scientist, Savannah River National Lab.
Jenna M. (Wasylenko) Lindsey	Teacher, Atchison High School (KS)
Cassandra L. Ward (Ph.D., May 2014)	Senior Research Scientist, Wayne State Univ.
Dr. Igor L. Zheldakov (postdoc, 2010-13)	Chemist, Eastman Chemical Company

Former KU Undergraduates:

Emmaline R. Lorenzo (B.S., Chemistry/Honors, May 2018)	Grad Student, Northwestern Univ.
Whitney M. Harmon (B.S., Chemistry, May 2018)	Grad Student, Univ. of Iowa
Brooks Hidaka (B.S., Chemistry, May 2018)	Grad Student, KU School of Educ.
Jung Moon Suh (B.S., Chemistry, May 2018)	
Nicholas Jackson (B.S., Chemistry, May 2017)	Teacher, Olathe South HS (KS)
Jorge L. Perez (UKanTeach; McNair Scholar)	
Thomas Hurley (B.S., Chemical Engineering, May 2016)	Peace Corps (Cameroon)
Victoria L. Gunderson (B.A., Chemistry, May 2016)	Assistant Brewer, Lawrence, KS
Johnathon R. Bliss (B.S., Chemistry, May 2015)	KU Computer Science
Graham Oltjen (B.S., Chemistry, May 2014)	Lab Technician, Houston, TX
William L. Cleek (B.S., Chemistry, May 2013)	Medical Resident, U. Washington
Heidi J. LeSage (B.S., Chemistry, May 2011)	Pearson Education, Portland, OR
Alyssa Auld (B.S., Chemistry Education, May 2010)	Teacher, Mill Valley HS (KS)

Summer REU Students:

Ryan Hamelin (NSF-REU; Summer 2015)	Banzan International, Acton, MA
Darien J. Morrow (NSF-REU; Summer 2014)	Grad Student, U. of Wisconsin
Samantha L. Allen (NSF-REU; Summer 2013)	Grad Student, U. of Colorado

Tyler A. Tommey (*NSF-REU; Summer 2011*)
Joseph M. Varberg (*NSF-REU; Summer 2010*)

Grad Student, U. of Akron
Grad Student, IUPUI

COURSES TAUGHT

CHEM 110 Introductory Chemistry
CHEM 180 Chemistry Seminar I
CHEM 511 Biological Physical Chemistry Laboratory
CHEM 525 Physical Chemistry for Engineers
CHEM 530 Physical Chemistry I
CHEM 531 Physical Chemistry I Laboratory
CHEM 536 Physical Chemistry II Laboratory
CHEM 537 Physical Chemistry Laboratory
CHEM 695 Chemistry Seminar II
CHEM 700 Responsible Scholarship in the Chemical Sciences
CHEM 750 Introduction to Quantum Mechanics
CHEM 854 Chemical Kinetics and Dynamics

PROFESSIONAL SERVICE

University of Kansas:

Faculty Senate Research Committee, *2019-2020*
Ad Hoc Committee on Student Evaluation of Teaching, *2018-19*
Faculty Senate & University Senate (elected), *2015-18*
Undergraduate STEM Education Committee, *2013*

College of Liberal Arts & Sciences:

Joint Committee on STEM Teacher Preparation (with School of Ed.), *2020-*
Committee on Undergraduate Studies and Advising (CUSA; elected), *2017-20*
College Faculty Mentor Advisory Committee, *2018-*
College Faculty Mentor Program (for at-risk undergraduates), *2016-*
Committee on Graduate Studies (CGS), *2012-13, 2015*

Department of Chemistry:

Faculty Mentor, Chemistry Graduate Student Organization (ChemGSO), *2017-*
Graduate Recruiting Weekend Committee (chair), *2019-20*
Faculty Performance Review Committee (elected), *2016-19*
Graduate Admissions Committee (chair 2012-14), *2010-15, 2018-19*
Ad Hoc Integrated Science Building Atrium Art Committee (chair), *2017-18*
Graduate Recruiting Committee, *2009-10, 2016-18*
Chemistry REU Program Committee, *2015-16*
Chair Advisory Committee, *2010-11, 2015-16*
Physical Chemistry Faculty Search Committee, *2013*
Department Chair Search Committee, *2013*
Search Committee for Graduate Programs Assistant, *2012, 2014*
Search Committee for Director of Instrumentation Teaching Laboratories, *2011*
Physics Machine Shop Committee, *2011*

Meetings/Symposia/Workshops Organized:

Spectroscopy Applied to Structure, Dynamics, and Imaging, American Chemical Society
Midwest Regional Meeting (MWRM), Lawrence, KS (October 18-20, 2017)
Spectroscopy and Dynamics on Multiple Potential Energy Surfaces, 72nd International
Symposium on Molecular Spectroscopy, Urbana-Champaign, IL (June 19-23, 2017)

High School Teacher Development Workshops (co-organizer and presenter):

Seeing the Unseen in Physical Sciences, Manhattan, KS (June 15-16, 2017)
Seeing the Unseen in Physical Sciences, Manhattan, KS (June 9-10, 2016)

Connecting the Physics of Waves and Electromagnetic Radiation with the Next Generation Science Standards (NGSS), Manhattan, KS (June 8-10, 2015)

Proposal Reviews:

Department of Energy, National Science Foundation, Petroleum Research Fund, Ohio University Research Council, Czech Science Foundation (GACR), French National Research Agency (ANR), German Research Foundation (DFG), CRDF Global

Journal Reviews:

Accounts of Chemical Research, ACS Applied Materials and Interfaces, Advanced Materials, Applied Physics Letters, Applied Sciences, Chemical Physics, Chemical Physics Letters, Chemical Science, Chemistry- A European Journal, ChemPhotoChem, ChemPhysChem, Colloids and Surfaces, Inorganic Chemistry, Journal of the American Chemical Society, Journal of Chemical Physics, Journal of Computational Chemistry, Journal of Physical Chemistry, Journal of Physical Chemistry Letters, Nature, Nature Chemistry, Nature Communications, Optical Materials, Optics Letters, Photochemical and Photobiological Sciences, Photochemistry and Photobiology, Physical Chemistry Chemical Physics (PCCP), Science, Science Advances

– September 14, 2020