

# Thomas K. Allison

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Stony Brook University  
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## Education

Ph.D. Physics, University of California at Berkeley, 2010.  
Thesis Advisors: Roger Falcone and Ali Belkacem  
Dissertation: "Femtosecond Molecular Dynamics Studied with Vacuum Ultraviolet Pulse Pairs"  
M.S. Physics, University of California at Berkeley, 2006.  
B.S. Engineering Physics, Cornell University, 2003.  
Summa Cum Laude with honors  
Dissertation: "A New Pressure Gauge for UHV and XHV"

## Honors and Awards

DOE Early Career Award, 2016.  
AFOSR Young Investigator, 2013.  
JILA Scientific Achievement Award, 2012.  
National Research Council/NIST Postdoctoral Research Associate Awardee, 2009.  
Marie Curie Fellowship Awardee, 2009.  
Hertz Foundation Fellowship Finalist, 2005.  
Outstanding Graduate Student Instructor Award. University of California at Berkeley, 2004.  
Paul Hartman Prize in Experimental Physics. Cornell University, 2003.  
Merrill Presidential Scholar. Cornell University, 2003.

## Employment

Assistant Professor. Stony Brook University, 2013-Present  
National Research Council Postdoctoral Fellow, 2010 to 2012.  
Graduate Student Researcher, University of California at Berkeley, 2004-2010.  
Graduate Student Instructor, University of California at Berkeley, 2003-2004.

## Students and Postdocs Mentored

Yuning Chen, 2013-present, Melanie A. Roberts Reber 2013-2016, Donald Willcox 2013, Kevin Keleher 2013-2014, Peng Zhao 2014-present. Xinlong Li 2014-present, Austin Polanco 2014-2015, Kegan Orłowski 2015, Christopher Corder 2015-Present, Hui Li 2016, Fangqiong Yuan 2016-Present, Zihan Zhang 2016, Myles Silfies 2016-Present, Elena Pavlenko 2016-present.

## Publications

### Journal Articles

- T. K. Allison. "Cavity-enhanced ultrafast two-dimensional spectroscopy using higher-order modes". *J. Phys. B.* **50**, 044004 (2017).
- X. L. Li, M. A. R. Reber, C. Corder, Y. Chen, P. Zhao, and T. K. Allison. "High-power ultrafast Yb: fiber laser frequency combs using commercially available components and basic fiber tools". *Rev. Sci. Inst.* **87**, 093114 (2016).
- M. A. R. Reber, Y. Chen, and T. K. Allison, "Cavity-enhanced ultrafast spectroscopy: ultrafast meets ultrasensitive". *Optica* **3**, 311 (2016).
- C. Benko, L. Hua, T. K. Allison, F. Labaye, and J. Ye. "Cavity-Enhanced Field-Free Molecular Alignment at a High Repetition Rate". *Phys. Rev. Lett.* **114**, 153001 (2015).
- C. Benko, T. K. Allison, A. Cingöz, L. Hua, F. Labaye, D. C. Yost, and J. Ye. "Extreme Ultraviolet Radiation with Coherence Time Beyond 1 s". *Nature Photonics* **8**, 530 (2014).
- T. E. Glover, D. M. Fritz, M. Cammarata, J. Feldkamp, T. K. Allison, H. Lemke, D. Zhu, R. N. Coffee, Sinisa Coh, S. Schwartz, D. A. Reis, S. E. Harris, and J. B. Hastings. "Microprobing Light-Matter Interactions with X-ray plus Optical Wavemixing". *Nature* **498**, 603 (2012).
- T. K. Allison, H. Tao, W. Glover, T. W. Wright, A. M. Stooke, C. Khurmi, J. van Tilborg, Y. Liu, R. W. Falcone, T. J. Martinez, and A. Belkacem. "Ultrafast Internal Conversion in Ethylene. II. Mechanisms and Pathways for Quenching and Hydrogen Elimination". *J. Chem. Phys.* **136**, 124317 (2012).
- A. Cingöz, D. C. Yost, T. K. Allison, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye. "Direct Frequency Comb Spectroscopy in The Extreme Ultraviolet". *Nature* **482**, 68 (2012).
- T. K. Allison, A. Cingöz, D. C. Yost, and J. Ye. "Extreme Nonlinear Optics in a Femtosecond Enhancement Cavity", *Phys. Rev. Lett.* **107**, 183903 (2011).
- D. C. Yost, A. Cingöz, T. K. Allison, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye. "Power Optimization of XUV Frequency Combs for Spectroscopy Applications", *Opt. Exp.* **19**, 23483 (2011).
- H. Tao, T. K. Allison, T. W. Wright, A. M. Stooke, C. Khurmi, J. van Tilborg, Y. Liu, R. W. Falcone, A. Belkacem, and T. J. Martinez. "Ultrafast Internal Conversion in Ethylene. I. The Excited State Lifetime", *J. Chem. Phys.* **134**, 244306 (2011).
- A. Cingöz, D. C. Yost, T. K. Allison, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "Broadband Phase Noise Suppression in a Yb-fiber Frequency Comb", *Opt. Lett.* **36**, 743 (2011)
- T. K. Allison, T. W. Wright, A. M. Stooke, C. Khurmi, J. van Tilborg, Y. Liu, R. W. Falcone, and A. Belkacem. "Femtosecond Spectroscopy with Vacuum Ultraviolet Pulse Pairs", *Opt. Lett.* **35**, 3664 (2010).
- T. E. Glover, M. P. Hertlein, S. H. Southworth, T. K. Allison, J. van Tilborg, E. P. Kanter, B. Krassig, H. R. Varma, B. Rude, R. Santra, A. Belkacem, L. Young. "Controlling X-rays with Light", *Nature Physics* **6**, 69 (2010).
- T. K. Allison, J. van Tilborg, T. W. Wright, M. P. Hertlein, R. W. Falcone, and A. Belkacem. "Separation of High-Order Harmonics with Fluoride Windows", *Opt. Exp.* **17**, 8941 (2009).
- J. van Tilborg, T. K. Allison, T. W. Wright, M. P. Hertlein, R. W. Falcone, Y. Liu, H. Merdji, and A. Belkacem. "Femtosecond Isomerization Dynamics in the Ethylene Cation Measured in an EUV-pump NIR-probe configuration". *J. Phys. B.* **42**, 081002 (2009).

K.J. Gaffney et. al. "Observation of Structural Anisotropy and the Onset of Liquid-like Motion During the Nonthermal Melting of InSb", *Phys. Rev. Lett.* **95**, 125701 (2005).

A. M. Lindenberg, Y. Acremann, D. P. Lowney, P. A. Heimann, T. K. Allison, T. Matthews, and R. W. Falcone. "Time Resolved Measurements of the Structure of Water at Constant Density", *J. Chem. Phys.* **122** 204507 (2005).

A.M. Lindenberg et. al. "Atomic Scale Visualization of Inertial Dynamics", *Science* **308**, 392 (2005).

### *Selected Seminars, Colloquium, and Conference Presentations*

T. K. Allison "Ultrafast dynamics of charge transfer at molecule/surface interfaces", Gordon Research Conference on Dynamics at Surfaces, July 30-Aug 4, 2017 [INVITED].

T. K. Allison "Ultrafast dynamics of cold gas-phase molecular complexes", New York University Chemistry Seminar, April 18, 2017 [INVITED].

T. K. Allison "Cavity-enhanced ultrafast spectroscopy: ultrafast meets ultrasensitive", Yale University Physical Chemistry Seminar, Dec. 6, 2016 [INVITED].

T. K. Allison, M. A. R. Reber, and Y. Chen, "Cavity-Enhanced Ultrafast Spectroscopy: Ultrafast meets Ultrasensitive". International Conference on Ultrafast Phenomena. Santa Fe, New Mexico. July 17-22, 2016.

C. Corder and T. K. Allison "Some ideas for determining the  $f_0$  of an x-ray frequency comb produced via XFEL". XFEL Science Workshop, June 29-July 1, 2016. SLAC National Accelerator Laboratory.

T. K. Allison, "Cavity-Enhanced Ultrafast Spectroscopy", 47th Annual Meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP), American Physical Society. Providence, Rhode Island, May 23-27, 2016 [INVITED].

T. K. Allison, "Extreme Ultraviolet Frequency Combs: Principles and Applications". Winter College on Optics. Abdus Salam International Centre for Theoretical Physics", Trieste, Italy. Feb. 18, 2016 [INVITED].

T. K. Allison, "Cavity-Enhanced Ultrafast Spectroscopy: Ultrafast meets Ultrasensitive", Seminar at the Max Planck Institute for Quantum Optics, Garching, Germany. Feb. 15, 2016 [INVITED].

T. K. Allison, "Cavity-Enhanced Transient Absorption Spectroscopy". 70th International Symposium on Molecular Spectroscopy. June 2015. [INVITED]

T. K. Allison "High Brightness XUV Frequency Combs and Applications", Stanford Photonics Research Center 2014 Annual Symposium. September 15-18, 2015. [INVITED]

M. A. R. Reber, Y. Chen, K. Keleher, and T. K. Allison "Cavity-Enhanced Transient Absorption Spectroscopy", Gordon Research Conference on Vibrational Spectroscopy. Aug. 3-8, 2014. [HOT TOPIC TALK]

Y. Chen, M. A. R. Reber, K. Keleher, and T. K. Allison "Cavity-Enhanced Ultrafast Transient Absorption Spectroscopy", 69<sup>th</sup> International Symposium on Molecular Spectroscopy. June 16-20, University of Illinois at Urbana-Champaign.

T. K. Allison "Overview of High Harmonic Spectroscopy", Gordon Research Conference on Multiphoton Processes. Bentley University, Waltham, MA. June 15-20, 2014. [INVITED]

T. K. Allison, C. Benko, A. Cingöz, L. Hua, F. Labaye, D. C. Yost, and J. Ye. "Extreme Ultraviolet Radiation with Coherence Time Longer than 1 fs", APS Division of Atomic, Molecular and Optical Physics (DAMOP) Conference. Madison, WI, June 4, 2014.

T. K. Allison "Chemical physics with synchrotrons and laser based VUV sources", Advanced Light Source User's Meeting, Berkeley, CA. Oct. 8 2013. [INVITED]

T. K. Allison, "High Brightness XUV Frequency Combs and Applications", Ultrafast X-ray Science Laboratory Seminar, Berkeley, CA. July 29, 2013. [INVITED]

T. K. Allison, H. Tao, W. Glover, T. W. Wright, A. M. Stooke, C. Khurmi, J. van Tilborg, Y. Liu, R. W. Falcone, T. J. Martinez, and A. Belkacem. "Ultrafast Internal Conversion in Ethylene Studied with Vacuum Ultraviolet Pulse Pairs", XXV International Symposium on Molecular Beams. Prague, Czech Republic, June 10, 2013.

C. Benko, T. K. Allison, A. Cingöz, D. C. Yost, and J. Ye, "Direct Measurement of the XUV Frequency Comb Coherence". 2013 Joint Meeting of the APS Division of Atomic, Molecular and Optical Physics and the CAP Division of Atomic, Molecular and Optical Physics (DAMOP), Quebec City, Canada. June 7, 2013.

T. K. Allison, A. Cingöz, D. C. Yost, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "High Brightness XUV Frequency Combs via Intracavity High Harmonic Generation", Williams College Physics Colloquium, Feb., 2013. [INVITED]

T. K. Allison, A. Cingöz, C. Benko, D. C. Yost, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "High Brightness XUV Frequency Combs via Intracavity High Harmonic Generation", University of British Columbia AMO Physics seminar, Nov 27, 2012. [INVITED]

T. K. Allison, A. Cingöz, C. Benko, D. C. Yost, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "High Brightness XUV Frequency Combs via Intracavity High Harmonic Generation", XVIIIth International Conference on Ultrafast Phenomena. Lausanne, Switzerland, July 8-13, 2012. [INVITED]

A. Cingöz, T. Allison, D. Yost, C. Benko, A. Ruehl, M. Ferman, I. Hartl, and J. Ye, "Frequency combs and precision spectroscopy in the extreme ultraviolet", 43rd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics (DAMOP), June 8, 2012 [INVITED HOT TOPICS]

T. K. Allison, A. Cingöz, D. C. Yost, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "Power Scaling and Stability of Intracavity High Order Harmonic Generation", 42nd Annual Meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP), American Physical Society. Atlanta, Georgia 2011.

C. Khurmi, T. K. Allison, T. W. Wright, A. M. Stooke, R. W. Falcone, and A. Belkacem. "Studying Ultrafast Internal Conversion Dynamics in Ethylene using ultrafast VUV-XUV pulses", 42nd Annual Meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP), American Physical Society. Atlanta, Georgia 2011.

T. K. Allison, A. Cingöz, D. C. Yost, A. Ruehl, M. E. Fermann, I. Hartl, and J. Ye, "The XUV frequency comb and prospects for an x-ray comb", Workshop on Evolution and Control of Complexity, Argonne National Laboratory, 2010. [INVITED]

T. K. Allison, T. W. Wright, A. M. Stooke, C. Khurmi, J. van Tilborg, Y. Liu, R. W. Falcone, and A. Belkacem. "Femtosecond Dynamics of Small Molecules Studied with Vacuum Ultraviolet Pulse Pairs", in Ultrafast Phenomena XVII, page 77. Snowmass, CO 2010.

D. C. Yost, A. Cingöz, T. K. Allison, J. Ye, A. Ruehl, M. E. Fermann, and I. Hartl. "Power Scaling of High Repetition Rate HHG", in Ultrafast Phenomena XVII, page 18. Snowmass, CO 2010.

A. Belkacem, T. K. Allison, C. Khurmi, T. W. Wright, and A. M. Stooke. "Femtosecond time-resolved study of the dissociation of small molecules using a two-color vacuum ultraviolet pump and x-ray probe technique". 41st Annual Meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP), American Physical Society. Houston, Texas 2010.

J. van Tilborg, T. K. Allison, T. W. Wright, M. P. Hertlein, R. W. Falcone, and A. Belkacem. "EUV-driven femtosecond dynamics in ethylene". *Journal of Physics: Conference Series* **194**, 012105. International Conference on Photonic, Electronic, and Atomic Collisions (ICPEAC), 2009.

T. K. Allison, "Femtosecond Dynamics and Multiphoton Ionization driven with an Intense High Order Harmonic Source", Santa Clara University Physics Colloquium. April 27, 2009. [INVITED]

T. K. Allison, "Femtosecond Dynamics and Multiphoton Ionization driven with an Intense High Order Harmonic Source", Stanford Linear Accelerator Center PULSE institute seminar. Nov. 12, 2008. [INVITED].

## Courses Taught

PHY 598 Graduate Seminar, Atomic and Solid State, CHE 521 Quantum Chemistry I, PHY 515/445 Advanced Laboratory.

## Professional Service

Reviewer for the Optical Society of America (OSA), the American Physical Society (APS), the American Institute of Physics (AIP), the National Science Foundation (NSF), the Air Force Office of Scientific Research (AFOSR), and the Department of Energy (DOE). Review editor for *Frontiers in Physical Chemistry*. Member of the OSA, the American Physical Society (APS), and the American Chemical Society (ACS).