

CURRICULUM VITAE

Timothy D. Scarborough

Senior Researcher

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EDUCATION

- Ph. D. **University of Nebraska – Lincoln**, AMOP Physics, 05/2012 Dissertation
adviser: Prof. Cornelis Uiterwaal
- M. S. **University of Nebraska – Lincoln**, AMOP Physics, 12/2009
- B. S. **University of Nebraska – Lincoln, Physics and Astronomy, 12/2006**

APPOINTMENTS

- 12/2019 – present **Senior Researcher, NSF-NeXUS Facility, The Ohio State University**
System Implementation Lead of a national user facility run by NSF Chemistry
- 09/2015 – 12/2019 **Postdoctoral Researcher**, Prof. Louis DiMauro, **The Ohio State University**
Investigation of attosecond-scale charge migration dynamics in complex
molecules using high harmonic spectroscopy
- 08/2012 – 07/2015 **Postdoctoral Research Scholar**, Prof. Ahmed Zewail (*Nobel Prize 1999*), **Caltech**
Studying dynamic laser-induced surface charge transients with scanning
ultrafast electron microscopy.
- 01/2007 – 07/2012 **Graduate Research Assistant**, Prof. Cornelis Uiterwaal, **UNL**
Investigation of femtosecond-scale ionization and fragmentation dynamics of
organic molecules; teaching undergraduate physics and mentoring graduate
students

SELECTED PUBLICATIONS IN REFEREED JOURNALS

7. K. A. Hamer, D. R. Tuthill, T. D. Scarborough, L. F. DiMauro, K. Lopata, K. J. Schafer, M. B. Gaarde, F. Mauger, "Orbital-resolved calculations of two-center interferences in linear triatomic molecules," *Phys. Rev. A* **104** (2021).
6. D. R. Tuthill, F. Mauger, T. D. Scarborough, R. R. Jones, M. B. Gaarde, K. Lopata, K. J. Schafer, L. F. DiMauro, "Multidimensional molecular high-harmonic spectroscopy: A road map for charge migration studies," *J. Mol. Spec.* **372** (2020).
5. T. T. Gorman, T. D. Scarborough, P. M. Abanador, F. Mauger, D. Kieseewetter, P. Sándor, S. Khatri, K. Lopata, K. J. Schafer, P. Agostini, M. B. Gaarde, L. F. DiMauro, "Probing the interplay between geometric and electronic-structure features via high-harmonic spectroscopy," *J. Chem. Phys.* **150** (2019).
4. T. D. Scarborough, T. T. Gorman, F. Mauger, M. Gaarde, K. Schafer, P. Agostini, and L. F. DiMauro, "Full characterization of a molecular Cooper minimum through high harmonic spectroscopy," *Appl. Sci.* **8**(7), (2018).
3. E. Najafi, T. D. Scarborough, J. Tang, and A. H. Zewail, "Four-dimensional imaging of carrier interface dynamics in p-n junctions," *Science* **347** (2015).
2. T. D. Scarborough and C. J. G. J. Uiterwaal, "Simulating the focal volume effect: a quantitative analysis," *Laser Phys.* **23**(12) (2013).
1. T. D. Scarborough, D. B. Foote, and C. J. G. J. Uiterwaal, "Ultrafast resonance-enhanced multiphoton ionization in the azabenzenes: pyridine, pyridazine, pyrimidine, and pyrazine," *J. Chem. Phys.* **136**, (2012).

A full publication list is available on Google Scholar.

INVITED LECTURES (Excluding conference presentations)

2022 October	The Ohio State University Physics Undergraduate Series “NSF-NeXUS: a new frontier for ultrafast science in the US”
2019 February	National Institute of Scientific Research – Montreal “Opportunities in Dynamic Transmission Electron Microscopy
2019 January	University of North Florida “Optical vortices and high harmonic generation with ultrafast lasers”
2018 December	Brockport University Physics Department “Undergraduate Research with Ultrafast Lasers”
2015 August	Geneva, NE Rotary Club Public Luncheon “Research Science with Lasers”
2014 May	Caltech Center for Ultrafast Science and Technology Seminar “Ultrafast silicon pn junction dynamics on surfaces: control using bias voltage”
2013 May	Caltech Center for Ultrafast Science and Technology Seminar “Progress in attosecond science”
2012 May	The Ohio State University AMO Physics Seminar “Photoionization and photofragmentation of substituted organic molecules”
2012 April	UNL Physics Colloquium and Dissertation Defense “Photoionization and photofragmentation of substituted organic molecules”
2011 December	UNL Physics Colloquium “Intense-field Photodynamics of Astatine-substituted Organic Molecules”
2011 January	UNL AMOP Physics Seminar “Intense-field dynamics of substituted benzene derivatives”
2010 November	Texas Lutheran University Physics Colloquium “Laser-driven excitation and ionization of aromatic molecules”

ADDITIONAL SKILLS

Laboratory Experience

- Alignment, calibration, maintenance and repair of ultrafast optical systems
- Maintaining and modifying ultrahigh vacuum equipment
- Automation and motorized control
- High harmonic generation and high harmonic spectroscopy
- Scanning electron microscopy (both standard and ultrafast)
- Ion mass spectrometry
- Hardware, plumbing, electrical, machining

Analytical Experience

- Project management
- Strategic planning
- Statistical analysis
- Correlation mapping
- Scientific plotting
- Introductory machine learning analysis
- Quantum interference and probability mapping

Programming and Software

Proficient: MATLAB, NI LabVIEW, Maple, OriginPro, Excel

Capable: POV-Ray, Mathematica, Gaussian, IDL, Python, LaTeX