

# Li Fang, Ph.D.

Department of Physics, University of Central Florida

## EDUCATION

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### **Ph.D. in Physics**

University of Connecticut, CT 2009  
Dissertation: Strong-field induced vibrational coherence in iodine molecules.

### **B.S. in Applied Physics & Comprehensive Minor in Computer Science**

Beijing University of Technology, Beijing, China 2001

## PROFESSIONAL APPOINTMENTS & RESEARCH EXPERIENCE

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### **Assistant Professor**

Department of Physics, University of Central Florida 01/2020 – Present  
Ultrafast spectroscopy of charge dynamics/Photo-induced nanoplasmas

### **Research Scientist**

Department of Physics, The Ohio State University 10/2018 – 12/2019  
Photo-induced nanoplasmas/High harmonic generation in clusters

### **Research Associate**

Department of Physics, University of Texas at Austin 08/2014 – 09/2018  
XUV-induced nanoplasmas

### **Visiting Scientist**

SLAC National Laboratory, Menlo Park, CA 08/2009 – 08/2014  
Atomic and molecular photointeractions with ultrafast intense x-rays

### **Postdoctoral Research Associate**

Department of Physics, Western Michigan University 08/2009 – 06/2014

## TEACHING

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General Physics Classical Mechanics, Department of Physics, UCF 2020, 2021, 2023  
General Physics Electromagnetism, Department of Physics, UT Austin 2016

Graduate student mentoring: Christopher Lantigua (physics, UCF), Biridiana Rodriguez (physics, UCF)

Undergraduate student mentoring: Matthew Eggimann (Mechanical Engineering, UCF Fall 2020-Spring 2021), Kevin Nilsen (CREOL, Fall 2020-Spring 2021), Adam Phengsomphone (Mechanical Engineering, UCF, Summer 2021 - Spring 2022), Michael Kawara (Mechanical Engineering, UCF, Summer 2021 -Spring 2022), Martinez Ernesto (Computer Engineering UCF, Spring 2022),

Postdoc mentoring: Santwana Dubey (2021), Pranitha Sankar (2022-2023)

Chair for Honors Thesis: Adam Phengsomphone (Mechanical Engineering, UCF), “An Investigative Design of Gas Jet Nozzles and Their Flow Field Effect On Spatial Distribution” (2022)

**GRANTS AND AWARDS**

PI, UCF Jumpstart award, \$737,000 "Jump starting a new UCF facility supported by NSF – User Facility for Attosecond Soft x-rays and Terahertz (UFAST)"	10/2021 – 06/2023
PI, NSF Major Research Instrumentation, \$1,735,101, UCF credit 30% "MRI: Acquisition of a high-power 2 $\mu$ m laser system as the backbone of an ultrafast x-ray/THz facility"	09/2021 – 08/2024
PI, DOE Early Career, \$785,000, UCF credit 100% "Probing ultrafast XUV/x-ray induced electron correlation in the molecular frame"	09/2020 – 09/2025
Co-PI, DOE FES continuation grant, \$199,824, UCF credit 30%	

**SYNERGISTIC PROFESSIONAL EXPERIENCE****Journal reviewer:**

Nature Communication, Physical Review Letter, Physical Review A, Journal of Physics B: Atomic Molecular and Optical Physics, Journal of Chemical Physics, Journal of Electron Spectroscopy and Related Phenomena, Structural Dynamics (AIP), Optics Letters, Physical Review Research.

**Proposal Reviewer:** DOE, NSF, German Research Foundation 2020-2022

**Conference Session Chair:**

"Focus Session: Advances in AMO science with FELs," APS Division of Atomic, Molecular and Optical Physics (DAMOP), Virtual	05/2021
"Time-resolved electron dynamics and attoseconds spectroscopy," DAMOP, Ft. Lauderdale, FL	05/2018
"Molecular dynamics," DAMOP, Columbus, OH	06/2015

**Panels and Committees:**

NSF proposal panels	2021-2022
DOE, Fusion Energy Sciences, Basic Research Needs workshop panel	2022
DOE, Basic Energy Sciences, proposal on-site review panel	2023
ATTO2021 International Conference, organizer committee	2019-2023
CLEO conference, Fundamental Science: Ultrafast Science of Attosecond, X-Ray Free-Electron-Laser, and Ultra-Intense Light, organizer committee,	2019-2023
AMO assistant professor search committee, Department of Physics, UCF	2022
Undergraduate student life committee, Department of Physics, UCF	2022
Office space committee, Department of Physics, UCF	2022
Colloquium committee, Department of Physics, UCF	2020-2022
Outreach committee, Department of Physics, UCF	2020-2022
Research professor promotion committee, Department of Physics, UCF	2020
Physics candidacy exam committee, Department of Physics, UCF	2020
Assistant professor search committee, CREOL, UCF	2020

**PUBLICATIONS****Peer-reviewed journals:**

- [51] V. Leshchenko, B. Smith, A. Camacho Garibay, P. Agostini, and L.F. DiMauro, **L. Fang**, "Nano-plasma resonance condition in the middle-infrared spectral range," Physical Review E (accepted,

2023)

- [50] Zenghu Chang, **Li Fang**, Vladimir Fedorov, Chase Geiger, Shambhu Ghimire, Christian Heide, Nobuhisa Ishii, Jiro Itatani, Chandrashekhar Joshi, Yuki Kobayashi, Prabhat Kumar, Alphonse Marra, Sergey Mirov, Irina Petrushina, Mikhail Polyansky, David A. Reis, Sergei Tochitsky, Sergey Vasilyev, Lifeng Wang, Yi Wu, and Fangjie Zhou, "Intense infrared lasers for strong-field science," *Advances in Optics and Photonics* **14**, 652 (2022).
- [49] S. Li, T. Driver, P. Rosenberger, E. G. Champenois, J. Duris, A. Al-Haddad, V. Averbukh, J. C. T. Barnard, N. Berrah, C. Bostedt, P. H. Bucksbaum, R. Coffee, L. F. DiMauro, **L. Fang**, D. Garratt, A. Gatton, Z. Guo, G. Hartmann, D. Haxton, W. Helml, Z. Huang, A. C. LaForge, A. Kamalov, J. Knurr, M. Lin, A. A. Lutman, J. P. MacArthur, J. P. Marangos, M. Nantel, A. Natan, R. Obaid, J. T. O'Neal, N. H. Shivaram, A. Schori, P. Walter, A. L. Wang, T. J. A. Wolf, M. F. Kling, A. Marinelli, J. P. Cryan, "Attosecond Coherent Electron Motion in Auger-Meitner Decay," *Science*, **375**, 6578, (2021).
- [48] T. Driver, S. Li, E. G. Champenois, J. Duris, D. Ratner, T.J. Lane, P. Rosenberger, A. Al-Haddad, V. Averbukh, T. Barnard, N. Berrah, C. Bostedt, P. H. Bucksbaum, R. Coffee, L. F. DiMauro, **L. Fang**, D. Garratt, A. Gatton, Z. Guo, G. Hartmann, D. Haxton, W. Helml, Z. Huang, A. LaForge, A. Kamalov, M. F. Kling, J. Knurr, M. Lin, A. A. Lutman, J. P. MacArthur, J. P. Marangos, M. Nantel, A. Natan, R. Obaid, N. H. Shivaram, A. Schori, P. Walter, A. Wang, T. J. A. Wolf, A. Marinelli, J. P. Cryan, "Attosecond Transient Absorption Spooktroscopy: a ghost imaging approach to ultrafast absorption spectroscopy," *Phys. Chem. Chem. Phys.*, **22** 2704 (2020).
- [47] R. Obaid, K. Schnorr, T. Wolf, T. Takanashi, N. Kling, K. Kooser, K. Nagaya, S. Wada, **L. Fang**, S. Augustin, D. You, E. Campbell, H. Fukuzawa, C. Schulz, K. Ueda, P. Lablanquie, T. Pfeifer, E. Kukuk, and N. Berrah "Photo-ionization and fragmentation of  $\text{Sc}_3\text{N}@C_{80}$  following excitation above the Sc K-edge," *J. Chem. Phys.* **151** 104308 (2019).
- [46] N. Berrah, A. Sanchez-Gonzalez, Z. Jurek, R. Obaid, H. Xiong, R. J. Squibb, T. Osipov, A. Lutman, **L. Fang**, T. Barillot, J. D. Bozek, J. Cryan, T. Wolf, D. Rolles, R. Coffee, K. Schnorr, S. Augustin, H. Fukuzawa, K. Motomura, N. Niebuhr, M. Guehr, L. J. Frasinski, R. Feifel, C-P. Schulz, K. Toyota, S.-K. Son, K. Ueda, T. Pfeifer, J.P. Marangos and R. Santra, "X-ray multiphoton ionization of molecules: Femtosecond-resolved observation of delayed fragmentation and evaporation of neutral atoms," *Nature Physics*, **15** 1279 (2019).
- [45] R. Kupfer, H. J. Quevedo, H. L. Smith, T. N. Ha, A. Yandow, G. Tiwari, C. G. Richmond, **L. Fang**, and B. M. Hegelich, "Plasma Emission Characteristics in Laser Induced Breakdown Spectroscopy of Silicon with Mid-Infrared, Multi-Millijoule, Nanosecond Laser Pulses from a Ho:YLF Excitation Source," *Applied Optics* **58** 4592 (2019).
- [44] R. Kupfer, H. J. Quevedo, H. L. Smith, L. A. Lisi, G. Tiwari, C. G. Richmond, B. B. Bowers, **L. Fang**, and B. M. Hegelich, "Cascade Random-Quasi-Phase-Matched Harmonic Generation in Polycrystalline ZnSe," *J. Appl. Phys.* **124** 243102 (2018).
- [43] **L. Fang**, H. Xiong, E. Kukuk, V. S. Petrovic, and N. Berrah, "X-ray initiated photodissociation of the glycine molecule," *Phys. Rev. A* **98** 053408 (2018).
- [42] H. Xiong, **L. Fang**, T. Osipov, N. G. Kling, T. J. A. Wolf, E. Sistrunk, R. Obaid, M. Gühr, N. Berrah, "Fragmentation of endohedral fullerene  $\text{Ho}_3\text{N}@C_{80}$  in an intense femtosecond near-infrared laser field," *Phys. Rev. A* **97** 023419 (2018).
- [41] **L. Fang**, H. Xiong, E. Kukuk, and N. Berrah, "X-ray pump-probe investigation of charge and dissociation dynamics in methyl iodine molecule," *Applied Sciences* **7(5)** 529 (2017).
- [40] H. Xiong, R. Obaid, **L. Fang**, C. Bomme, U. Ablikim, V. Petrovic, C. E. Liekhus-Schmaltz, H. Li, R. C. Bilodeau, T. Wolf, D. Rolles, T. Osipov and N. Berrah, "X-ray induced ionization and fragmentation dynamics of endohedral fullerene  $\text{Sc}_3\text{N}@C_{80}$  investigated using ion-ion

- coincidence technique,” *Phys. Rev. A* **96** 033408 (2017).
- [39] H. Xiong, B. Mignolet, **L. Fang**, T. Osipov, T. J. A. Wolf, E. Sistrunk, M. Gühr, F. Remacle and N. Berrah, “The role of super-atom molecular orbitals in doped fullerenes in a femtosecond intense laser field,” *Scientific Reports (Nature)*, **7** 121 (2017).
- [38] N. Berrah, **L. Fang**, B. F. Murphy, E. Kukk, T. Y. Osipov, R. Coffee, K. R. Ferguson, H. Xiong, J. Castagna, V. S. Petrovic, S. C. Montero and J. D. Bozek, “Two mirror x-ray pulse split and delay instrument for femtosecond time resolved investigations at the LCLS free electron laser facility,” *Optics Express* **24** 11768 (2016).
- [37] A. Sanchez-Gonzalez, T. R. Barillot, R. J. Squibb, P. Kolorenč, M. Agaker, V. Averbukh, M. J. Bearpark, C. Bostedt, J. D. Bozek, S. Bruce, S. Carron Montero, R. N. Coffee, B. Cooper, J. P. Cryan, M. Dong, J. H. D. Eland, **L. Fang**, H. Fukuzawa, M. Guehr, M. Ilchen, A. S. Johnsson, C. Liekhus-S, A. Marinelli, T. Maxwell, K. Motomura, M. Mucke, A. Natan, T. Osipov, C. Östlin, M. Pernpointner, V. S. Petrovic, M. A. Robb, C. Sathe, E. R. Simpson, J. G. Underwood, M. Vacher, D. J. Walke, T. J. A. Wolf, V. Zhaunerchyk, J.-E. Rubensson, N. Berrah, P. H. Bucksbaum, K. Ueda, R. Feife, L. J. Frasinski and J. P. Marangos, “Auger electron and photoabsorption spectra of glycine in the vicinity of the oxygen K-edge measured with an X-FEL,” *J. Phys. B: At. Mol. Opt. Phys.* **48** 234004 (2015).
- [36] N. Berrah and **L. Fang**, “Chemical analysis: Double core-hole spectroscopy with free-electron lasers”, *J. of Electron. Spectrosc. and Rela. Phenom.* **204** 284 (2015).
- [35] M. Mucke, V. Zhaunerchyk, L. J. Frasinski, R. J. Squibb, M. Siano, J. H. D. Eland, P. Linusson, P. Salén, P. v. d. Meulen, R. D. Thomas, M. Larsson, L. Foucar, J. Ullrich, K. Motomura, S. Mondal, K. Ueda, T. Osipov, **L. Fang**, B. F. Murphy, N. Berrah, C. Bostedt, J. D. Bozek, S. Schorb, M. Messerschmidt, J. M. Glowia, J. P. Cryan, R. N. Coffee, O. Takahashi, S. Wada, M. N. Piancastelli, R. Richter, K. C. Prince and R. Feifel, “Covariance mapping of two-photon double core hole states in C<sub>2</sub>H<sub>2</sub> and C<sub>2</sub>H<sub>6</sub> produced by an X-ray free electron laser,” *New Journal of Physics* **17** 073002 (2015).
- [34] B. F. Murphy, T. Osipov, Z. Jurek, **L. Fang**, S.-K. Son, L. Avaldi, P. Bolognesi, C. Bostedt, J. Bozek, R. Coffee, J. Eland, M. Guehr, J. Farrell, R. Feifel, L. Frasinski, J. Glowia, D. T. Ha, K. Hoffmann, E. Kukk, B. McFarland, C. Miron, M. Mucke, R. Squibb, K. Ueda, R. Santra, and N. Berrah, “Bucky ball explosion by intense femtosecond x-ray pulses: a model system for complex molecules,” *Nature Communications* **5** 4281 (2014).
- [33] **L. Fang**, T. Osipov, B. F. Murphy, A. Rudenko, D. Rolles, V. Petrovic, C. Bostedt, J. D. Bozek, P. H. Bucksbaum, N. Berrah, *Review*: “Probing ultrafast electronic and molecular dynamics with free electron lasers,” *J. Phys. B: At. Mol. Opt. Phys.* **47** 124006 (2014).
- [32] N. Berrah, **L. Fang**, T. Osipov, Z. Jurek, B. F. Murphy, and R. Santra, “Emerging photon technologies for probing ultrafast molecular dynamics,” *Faraday Discuss.* **171** 471(2014).
- [31] B. K. McFarland, J. P. Farrell, S. Miyabe, F. Tarantelli, A. Aguilar, N. Berrah, C. Bostedt, J. Bozek, P. H. Bucksbaum, J. C. Castagna, R. Coffee, J. Cryan, **L. Fang**, R. Feifel, K. Gaffney, J. Glowia, T. Martinez, M. Mucke, B. Murphy, A. Natan, T. Osipov, V. Petrovic, S. Schorb, Th. Schultz, L. Spector, M. Swiggers, I. Tenney, S. Wang, W. White, J. White and M. Gühr, “Delayed ultrafast x-ray Auger probing (DUXAP) of nucleobase ultraviolet photoprotection,” *Nature Communications* **5** 4235 (2014).
- [30] L. J. Frasinski, V. Zhaunerchyk, M. Mucke, R. J. Squibb, M. Siano, J. H. D. Eland, P. Linusson, P. v. d. Meulen, P. Salén, R. D. Thomas, M. Larsson, L. Foucar, J. Ullrich, K. Motomura, S. Mondal, K. Ueda, T. Osipov, **L. Fang**, B. F. Murphy, N. Berrah, C. Bostedt, J. D. Bozek, S. Schorb, M. Messerschmidt, J. M. Glowia, J. P. Cryan, R. Coffee, O. Takahashi, S. Wada, M. N. Piancastelli, R. Richter, K. C. Prince and R. Feifel, “Dynamics of hollow atom formation in intense x-ray pulses mapped by partial covariance,” *Phys. Rev. Lett.* **111** 073002 (2013).

- [29] C. Bostedt, J. D. Bozek, P. H. Bucksbaum, R. N. Coffee, J. B. Hastings, Z. Huang, R. W. Lee, S. Schorb, J. N. Corlett, P. Denes, P. Emma, R. W. Falcone, R. W. Schoenlein, G. Doumy, E. P. Kanter, B. Kraessig, S. Southworth, L. Young, **L. Fang**, M. Hoener, N. Berrah, C. Roedig, and L. F. DiMauro, "Ultra-fast and ultra-intense x-ray sciences: first results from the Linac Coherent Light Source free-electron laser," *J. Phys. B: At. Mol. Opt. Phys.* **46** 164003 (2013).
- [28] V. Zhaunerchyk, M. Mucke, P. Salén, P. v.d. Meulen, M. Kaminska, R. J. Squipp, L. J. Frasinski, M. Siano, J. H. D. Eland, P. Linusson, R. D. Thomas, M. Larsson, L. Foucar, J. Ullrich, K. Motomura, S. Mondal, K. Ueda, T. Osipov, **L. Fang**, B. F. Murphy, N. Berrah, C. Bostedt, J. D. Bozek, S. Schorb, M. Messerschmidt, J. M. Glownia, J. P. Cryan, R. N. Coffee, O. Takahashi, S. Wada, M. N. Piancastelli, R. Richter, K. C. Prince, and R. Feifel, "Using covariance mapping to investigate the dynamics of multi-photon ionization processes of Ne atoms exposed to X-FEL pulses," *J. Phys. B: At. Mol. Opt. Phys.* **46** 164034 (2013).
- [27] T. Osipov, **L. Fang**, B. Murphy, F. Tarantelli, E. R. Hosler, E. Kukk, J. D. Bozek, C. Bostedt, E. P. Kanter and N. Berrah, "Fragmentation of SF<sub>6</sub> induced by multiphoton ionization with intense x-ray free electron laser pulses," *J. Phys. B: At. Mol. Opt. Phys.* **46** 164032 (2013).
- [26] M. Larsson, P. Salén, P. van der Meulen, H. T. Schmidt, R. D. Thomas, R. Feifel, M. N. Piancastelli, **L. Fang**, B. Murphy, T. Osipov, N. Berrah, E. Kukk, K. Ueda, J. D. Bozek, C. Bostedt, S. Wada, R. Richter, V. Feyer and K. C. Prince, "Double core-hole formation in small molecules at the LCLS free electron laser," *J. Phys. B: At. Mol. Opt. Phys.* **46** 164030 (2013).
- [25] **L. Fang**, T. Osipov, B. Murphy, F. Tarantelli, E. Kukk, J.P. Cryan, M. Glownia, P.H. Bucksbaum, R.N. Coffee, M. Chen, C. Buth and N. Berrah, "Multiphoton ionization as a clock to reveal molecular dynamics with intense short X-FEL pulses," *Phys. Rev. Lett.* **109** 263001 (2012).
- [24] B. F. Murphy, **L. Fang**, M. H. Chen, J. D. Bozek, E. Kukk, E. P. Kanter, M. Messerschmidt, T. Osipov, and N. Berrah, "Multiphoton L-shell ionization of H<sub>2</sub>S using intense x-ray pulses from the LCLS free electron laser," *Phys. Rev. A* **86** 053423 (2012).
- [23] C. Buth, J. Liu, M. H. Chen, J. P. Cryan, L. Fang, J. M. Glownia, M. Hoener, R. N. Coffee, and N. Berrah, "Ultrafast absorption of intense x-rays by nitrogen molecules," *J. Chem. Phys.* **136** 214310 (2012).
- [22] V. S. Petrović, M. Siano, J. L. White, N. Berrah, C. Bostedt, J. D. Bozek, D. Broege, M. Chalfin, R. N. Coffee, J. Cryan, **L. Fang**, J. P. Farrell, L. J. Frasinski, J. M. Glownia, M. Güehr, M. Hoener, D. M. P. Holland, J. Kim, J. P. Marangos, Todd Martinez, B. K. McFarland, R. S. Minns, S. Miyabe, S. Schorb, R. J. Sension, L. S. Spector, R. Squibb, H. Tao, J. G. Underwood, and P. H. Bucksbaum, "Transient x-ray fragmentation: Probing a prototypical photoinduced ring opening," *Phys. Rev. Lett.* **108** 253006 (2012).
- [21] J. P. Cryan, J. M. Glownia, J. Andreasson, A. Belkacem, N. Berrah, C. I. Blaga, C. Bostedt, J. Bozek, N.A. Cherepkov, L. F. DiMauro, **L. Fang**, O. Gessner, M. Güehr, J. Hajdu, M. P. Hertlein, M. Hoener, O. Kornilov, J. P. Marangos, A. M. March, B. K. McFarland, H. Merdji, M. Messerschmidt, V. S. Petrović, C. Raman, D. Ray, D. A. Reis, S. K. Semenov, M. Trigo, J. L. White, W. White, L. Young, P. H. Bucksbaum and R. N. Coffee, "Molecular frame Auger electron energy spectrum from N<sub>2</sub>," *J. Phys. B: At. Mol. Opt. Phys.* **45** 055601 (2012).
- [20] P. Salén, P. v.d. Meulen, H. T. Schmidt, R. D. Thomas, M. Larsson, R. Feifel, M. N. Piancastelli, **L. Fang**, B. Murphy, T. Osipov, N. Berrah, E. Kukk, K. Ueda, J. D. Bozek, C. Bostedt, S. Wada, R. Richter, V. Feyer, K. C. Prince, "X-ray FEL-induced two-site double core-hole formation for chemical analysis," *Phys. Rev. Lett.* **108** 153003 (2012).
- [19] E. P. Kanter, B. Krässig, Y. Li, A. M. March, P. Ho, N. Rohringer, R. Santra, S. H. Southworth, L. F. DiMauro, G. Doumy, C. A. Roedig, N. Berrah, **L. Fang**, M. Hoener, P. H. Bucksbaum, S. Ghimire, D. A. Reis, J. D. Bozek, C. Bostedt, M. Messerschmidt, and L. Young, "Unveiling and driving hidden resonances with high-fluence, high-intensity x-ray pulses," *Phys. Rev. Lett.* **107** 233001 (2011).

- [18] H. Chen, **L. Fang**, V. Tagliamonti, and G. N. Gibson, "Angle-resolved and internuclear-separation-resolved measurements of the ionization rate of the B state of  $I_2$  by strong laser fields," *Phys. Rev. A* **84** 043427 (2011).
- [17] N. Berrah, **L. Fang**, B. Murphy, T. Osipov, K. Ueda, E. Kukk, R. Feifel, P. van der Meulen, P. Salén, H. T. Schmidt, R. D. Thomas, M. Larsson, R. Richter, K. C. Prince, J. D. Bozek, C. Bostedt, S. Wada, M. Piancastelli, M. Tashiro, M. Ehara, "Double core-hole spectroscopy for chemical analysis with an intense x-ray femtosecond laser," *Proceedings of the Academy of Science (PNAS)* **108** 16912 (2011).
- [16] G. Doumy, C. Roedig, S.-K. Son, C. I. Blaga, A. D. DiChiara, R. Santra, N. Berrah, C. Bostedt, J. D. Bozek, P. H. Bucksbaum, J. P. Cryan, **L. Fang**, S. Ghimire, J. M. Glowonia, M. Hoener, E. P. Kanter, B. Krässig, M. Kuebel, M. Messerschmidt, G. G. Paulus, D. A. Reis, N. Rohringer, L. Young, P. Agostini, and L. F. DiMauro, "Nonlinear atomic response to intense ultrashort x-rays," *Phys. Rev. Lett.* **106** 083002 (2011).
- [15] **L. Fang**, M. Hoener, O. Gessner, F. Tarantelli, S. T. Pratt, O. Kornilov, C. Buth, M. Güehr, E. Kanter, C. Bostedt, J. D. Bozek, P. H. Bucksbaum, M. Chen, R. Coffee, J. Cryan, L. DiMauro, M. Glowonia, E. Kukk, S.R. Leone and N. Berrah, "Double core-hole production in  $N_2$ : Beating the Auger clock," *Phys. Rev. Lett.* **105** 083005 (2010).
- [14] M. Hoener, **L. Fang**, O. Kornilov, O. Gessner, S.T. Pratt, M. Güehr, E. Kanter, C. Blaga, C. Bostedt, J. D. Bozek, P. H. Bucksbaum, C. Buth, M. Chen, R. Coffee, J. Cryan, L. DiMauro, M. Glowonia, E. Hosler, E. Kukk, S. R. Leone, B. McFarland, M. Messerschmidt, B. Murphy, V. Petrovic, D. Rolles, and N. Berrah, "Ultraintense x-ray induced ionization, dissociation, and frustrated absorption in molecule nitrogen," *Phys. Rev. Lett.* **104** 253002 (2010).
- [13] J. P. Cryan, J. Glowonia, N. Berrah, C. Blaga, J. D. Bozek, C. Buth, L. DiMauro, **L. Fang**, M. Güehr, M. Hoener, J. Marangos, A. M. March, B. McFarland, M. Trigo, L. Young, P. H. Bucksbaum and R. N. Coffee, "X-ray-induced multiple core vacancies in impulsively aligned molecules," *Phys. Rev. Lett.* **105** 083004 (2010).
- [12] J. M. Glowonia, J. Cryan, J. Andreasson, A. Belkacem, N. Berrah, C. I. Blaga, C. Bostedt, J. Bozek, L. F. DiMauro, **L. Fang**, J. Frisch, O. Gessner, M. Gühr, J. Hajdu, M. P. Hertlein, M. Hoener, G. Huang, O. Kornilov, J. P. Marangos, A. M. March, B. K. McFarland, H. Merdji, V. S. Petrovic, C. Raman, D. Ray, D. A. Reis, M. Trigo, J. L. White, W. White, R. Wilcox, L. Young, R. N. Coffee, and P. H. Bucksbaum, "Time-resolved pump-probe experiments at the LCLS," *Optics Express* **18** 17620 (2010).
- [11] L. Young, E. P. Kanter, B. Krässig, Y. Li, A. M. March, S. T. Pratt, R. Santra, S. H. Southworth, N. Rohringer, L. F. DiMauro, G. Doumy, C. A. Roedig, N. Berrah, **L. Fang**, M. Hoener, P. H. Bucksbaum, J. P. Cryan, S. Ghimire, J. M. Glowonia, D. A. Reis, J. D. Bozek, C. Bostedt, M. Messerschmidt, "Femtosecond electronic response of atoms to ultra-intense X-rays," *Nature (London)* **466** 56 (2010).
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- [3] "Direct femtosecond laser excitation of the 2p state of H by a resonant seven-photon transition in  $H_2^+$ ," G. N. Gibson, **L. Fang**, and B. Moser, *Phys. Rev. A (Rapid)* **74** 041401(R) (2006).
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- [10] **L. Fang**, Z. Jurek, T. Osipov, B. F. Murphy, R. Santra and N. Berrah, "Investigating dynamics of complex system irradiated by intense x-ray free electron laser pulses," *Journal of Physics: Conference Series* **601** 012006 (2015).
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- [7] B. K. McFarland, N Berrah, C. Bostedt, J. Bozek, P. H. Bucksbaum, J. C. Castagna, R. N. Coffee, J. P. Cryan, **L. Fang**, J. P. Farrell, R. Feifel, K. J. Gaffney, J. M. Glowia, T. J. Martinez, S. Miyabe, M. Mucke, B. Murphy, A. Natan, T. Osipov, V. S. Petrović, S. Schorb, Th. Schultz, L. S. Spector, M. Swiggers, F. Tarantelli, I. Tenney, S. Wang, J. L. White, W. White, and M. Gühr, "Experimental strategies for optical pump – soft x-ray probe experiments at the LCLS," *Journal of Physics: Conference Series* **488** 012015 (2014).
- [6] B. K. McFarland, J. P. Farrell, N. Berrah, C. Bostedt, J. Bozek, P.H. Bucksbaum, R. N. Coffee, J. Cryan, **L. Fang**, R. Feifel, K. Gaffney, J. Glowia, T. Martinez, M. Mucke, B. Murphy, S. Miyabe, A. Natan, T. Osipov, V. Petrovic, S. Schorb, Th. Schultz, L. Spector, F. Tarantelli, I. Tenney, S. Wang, W. White, J. White, M. Gühr, "Probing Nucleobase Photoprotection with soft x-rays," *EDP Web of Conferences* **41** 07004 (2013).
- [5] **L. Fang**, T. Osipov, B. Murphy, P. Juranic, N. Berrah, E. Kukk, K. Ueda, R. Feifel, P. van der Meulen, P. Salen, H. Schmidt, R. Thomas, M. Larsson, R. Richter, K. C. Prince, J. D. Bozek, C. Bostedt, S. Wada, M. Piancastelli, M. Tashiro, M. Ehara, and F. Tarantelli, "Multiple ionization and double core-hole production in molecules using the LCLS x-ray FEL," *Journal of Physics: Conference Series* **388** 032028 (2012).
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- [2] P. Salén, P. van der Meulen, R. D. Thomas, H. T. Schmidt, M. Larsson, R. Feifel, M. N. Piancastelli, **L. Fang**, T. Osipov, B. Murphy, P. Juranic, N. Berrah, E. Kukk, K. Ueda, R. Richter, K. C. Prince, J. D. Bozek, C. Bostedt, S. Wada, M. Tashiro, M. Ehara, and F. Tarantelli, "X-ray FEL induced double core hole formation in polyatomic molecules," *Journal of Physics: Conference Series* **388** 022083 (2012).
- [1] **L. Fang**, M. Hoener and N. Berrah, "Ultra-intense x-ray induced non-linear processes in molecular nitrogen," *Journal of Physics: Conference Series* **288** 012019 (2010).

### Books:

**L. Fang**, E. Kukk, J. D. Bozek, and N. Berrah, Chapter: "Ultrafast X-ray pump-probe investigation of molecular dynamics with free electron laser pulses," *Advances in Optics: Reviews Vol. 2*, S. Y. Yurish (Ed.), IFSA Publishing, Barcelona, Spain (2017). ISBN:978-84-697-9437-1. e-ISBN: 978-84-697-9438-8.

G. N. Gibson, **L. Fang**, and B. Moser, Chapter: "Vibrational and electronic excitation of molecules by short-pulse strong laser fields," *Progress in Ultrafast Intense Laser Science V*, K. Yamanouchi (Ed.), Springer, Berlin (2008). ISBN: 978-3-642-03824-2. e-ISBN: 978-3-642-03825-9.

### PRESENTATIONS

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#### Invited talks:

<b>Department of Physics, University of Florida</b> "Ultrafast X-ray and XUV Spectroscopy of Charge Dynamics In Molecular Systems"	11/2022
<b>20<sup>th</sup> International Symposium on Correlation, Polarization and Ionization in Atomic and Molecular Collisions (ICPEAC Satellite conference)</b> , Metz, France "Investigation of molecular fragmentation subsequent to photoionization by synchrotron radiation at core-level"	08/2019
<b>Department of Physics, Western Michigan University</b> "Imaging photoinduced particle fragmentation: Mass spectroscopy using x-ray sources and tabletop ultrafast lasers"	11/2018
<b>Department of Physics, University of Connecticut</b> "Photoionization of midsize systems with free electron laser and XUV laser pulses"	09/2015
<b>ICPEAC (International Conference on Photonic Electronic and Atomic Collisions) (e, 2e) symposium</b> , San Sebastian, Spain "Photoionization induced fragmentation of glycine molecule and endohedral fullerene Ho <sub>3</sub> N@C <sub>80</sub> molecule"	08/2015
<b>DAMOP</b> , Madison, WI "Molecular processes driven by high-intensity x-rays"	06/2014
<b>Gordon conference (Multiphoton processes)</b> , Mount Holyoke College, South Hadley, MA "Sequential investigation of double core holes with intense free electron laser pulses"	06/2012
<b>DOE Office of Science Graduate fellowship research meeting</b> , Argonne National Lab, Argonne, IL "Non-linear processes in the molecules using the world first hard x-ray FEL"	08/2010

#### Contributed talks (presenter):

<b>DAMOP</b> , Columbus, OH	06/2015
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L. Fang, H. Xiong, N. Berrah, T. Osipov and V Petrovic, "Core-hole decay induced fragmentation of glycine molecule."

**Intense Field, Short Wavelength Atomic and Molecular Processes 2**, Xi'an China 06/2013

L. Fang, T. Osipov, B. Murphy, F. Tarantelli, E. Kukk, J.P. Cryan, J. Glowonia, P.H. Bucksbaum, R.N. Coffee, M. Chen, C. Buth, and N. Berrah, "Molecular dynamics induced by intense x-ray FEL pulses."

**DAMOP**, Atlanta, GA USA

06/2011

L. Fang, B. Murphy, T. Osipov, N. Berrah, E. Kukk, M. Tashiro, M. Ehara, K. Ueda, K. C. Prince, R. Richter, R. Feifel, P. Salen, P. v d Meulen, H. Schmidt, R. D. Thomas, M. Larsson, "Study of double core holes in CO molecules created by intense short free electron laser pulses."

**CLEO/QELS**, San Jose, CA

05/2010

L. Fang, M. Hoener, M. Guehr, C. Blaga, C. Bostedt, J. D. Bozek, P. Bucksbaum, C. Buth, R. Coffee, J. Cryan, L. DiMauro, O. Gessner, J. Glowonia, E. Hosler, E. P. Kanter, O. Kornilov, E. Kukk, S. Leone, B. K. McFarlan, B. Murphy, S. T. Pratt, D. Rolles and N. Berrah, "Nonlinear processes in N<sub>2</sub> using LCLS short x-ray pulses."

**CLEO/QELS**, Baltimore, MD

05/2009

L. Fang and G. N. Gibson, "Wavelength-dependent study of trapping molecules in an excited electronic state of I<sub>2</sub><sup>2+</sup>."

**CLEO/QELS**, San Jose, CA

05/2008

L. Fang and G. N. Gibson, "Strong-field induced vibrational coherence in the ground electronic state of hot I<sub>2</sub>."

**Ultrafast and Ultrasmall PASI Workshop**, Buzios, Brazil

04/2008

L. Fang and G. N. Gibson, "Study of vibrational wavepackets in hot iodine molecules with ultrafast laser pulses"

**DAMOP**, Calgary, Canada

06/2007

L. Fang and G. N. Gibson, "Investigating excited electronic states of I<sub>2</sub><sup>+</sup> and I<sub>2</sub><sup>2+</sup> produced by strong-field ionization using vibrational wave packets."

**DAMOP**, Knoxville, TN USA

05/2006

L. Fang and G. N. Gibson, "Observation of enhanced excitation of I<sub>2</sub><sup>2+</sup> by strong laser fields."

#### **Posters (presenter):**

**Attosecond Science and Technology VIII**, Orlando, USA

07/2022

B Rodriguez, M Chini, T C Truong, M Vaida, Z Chang, L Fang\*, "User Facility for Attosecond Soft x-rays and THz at University of Central Florida"

**ICPEAC**, Toledo, Spain

07/2015

L. Fang, H. Xiong, T. Osipov, V. S. Petrovic and N. Berrah, "X-ray photoionization induced fragmentation of glycine molecule."

**ICPEAC**, Toledo, Spain

07/2015

H. Xiong, B. Murphy, L. Fang, T. Osipov, E. Kukk, V. Petrovic, H. Li, E. Sistrunk, R. Squibb, R. Feifel, K. Ferguson, J. Krzywinski, S. Montero, M. Guehr, C. Bostedt, P. Bucksbaum, N. Berrah, "Femtosecond x-ray induced fragmentation of Ho<sub>3</sub>N@C<sub>80</sub>."

**Vacuum Ultraviolet and X-ray Physics (VUVX)**, Hefei, China

07/2013

L. Fang, T. Osipov, B. Murphy, F. Tarantelli, E. Kukk, J.P. Cryan, J. Glowonia, P.H. Bucksbaum, R.N. Coffee, M. Chen, C. Buth, and N. Berrah, "Investigating molecular dynamics with an intrinsic multiple pump-probe mechanism by x-ray-FEL."

- SPIE Optics and photonics**, San Diego, CA 08/2012  
L. Fang, T. Osipov, B. Murphy, F. Tarantelli, E. Kukkk, J.P. Cryan, M. Glowonia, P.H. Bucksbaum, R.N. Coffee, M. Chen, C. Buth and N. Berrah, "Following dissociating N<sub>2</sub> molecules by probing them with femtosecond-range XFEL pulses."
- DAMOP**, Atlanta, GA 06/2011  
L. Fang, B. Murphy, T. Osipov, P. Juranic, N. Berrah, E. Kukkk, M. Tashiro, M. Ehara, K. Ueda, K. C. Prince, R. Richter, R. Feifel, P. Salen, P. v d Meulen, H. Schmidt, R. D. Thomas and M. Larsson, "Creating double core hole two sites in N<sub>2</sub> molecules using the Linac Coherent Light Source."
- Multiphoton Processes - Gordon Conference**, Tilton, NH 06/2008  
L. Fang and G. N. Gibson, "Comparison of Lochfrass and bondsoftening as mechanisms of creating vibrational coherence in hot molecules."