



James P. Cryan

Lead Scientist, SLAC National Accelerator Laboratory

 Curriculum Vitae available Online

Bio

BIO

I am interested in photo-induced dynamics of atoms and molecules. I am particularly interested in the dynamics of excited states in these systems, and how energy transfer takes place inside a molecule. The relevant timescales for these interactions is typically in the range of attoseconds to picoseconds. These dynamics include photo-triggered chemistry such as non Born-Oppenheimer molecular dynamics and quantum phenomena in strong-field driven systems. I also develop tools for studying these dynamics in the time domain.

My research builds on my extensive experience with ultrafast optical laser science and technology. As a graduate student at Stanford University I participated in the first experiments at the Linac Coherent Light Source, where we studied a new regime of X-ray-matter interactions. I was a postdoctoral scholar at Lawrence Berkeley National Laboratory before returning to SLAC to lead the attosecond science group.

CURRENT ROLE AT STANFORD

Principal Investigator, Stanford PULSE Institute

Atomic, Molecular, and Optical Sciences Department Head, Linac Coherent Light Source.

INSTITUTE AFFILIATIONS

- Member, Stanford PULSE Institute

HONORS AND AWARDS

- APS Fellow, American Physical Society (2020)
- William E. and Diane M. Spicer Young Investigator Award, SLAC National Accelerator Laboratory (2012)

EDUCATION AND CERTIFICATIONS

- B.S., The Ohio State University , Engineering Physics (2007)
- Ph.D., Stanford University , Physics (2012)

LINKS

- My Lab Website: <https://ultrafast.stanford.edu/ato-attosecond-science>

Professional

PROFESSIONAL INTERESTS

I am interested in photo-induced dynamics of atoms and molecules. I am particularly interested in the dynamics of excited states in these systems, and how energy transfer takes place inside a molecule. The relevant timescales for these interactions is typically in the range of attoseconds to picoseconds. These dynamics include photo-triggered chemistry such as non Born-Oppenheimer molecular dynamics and quantum phenomena in strong-field driven systems. I also develop tools for studying these dynamics in the time domain.

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

- Atomic, Molecular, and Optical Sciences Department Head, Linac Coherent Light Source, SLAC National Accelerator Laboratory (2021 - present)
- Principle Investigator, Stanford PULSE Institute (2014 - present)

Publications

PUBLICATIONS

- **Attosecond coherent electron motion in Auger-Meitner decay.** *Science (New York, N.Y.)*
Li, S., Driver, T., Rosenberger, P., Champenois, E. G., Duris, J., Al-Haddad, A., Averbukh, V., Barnard, J. C., Berrah, N., Bostedt, C., Bucksbaum, P. H., Coffee, R. N., DiMauro, et al
1800; eabj2096
- **Controllable X-Ray Pulse Trains from Enhanced Self-Amplified Spontaneous Emission.** *Physical review letters*
Duris, J. P., MacArthur, J. P., Glownia, J. M., Li, S., Vetter, S., Miahnahri, A., Coffee, R., Hering, P., Fry, A., Welch, M. E., Lutman, A., Decker, F., Bohler, et al
2021; 126 (10): 104802
- **Electron correlation effects in attosecond photoionization of CO₂** *PHYSICAL REVIEW A*
Kamalov, A., Wang, A. L., Bucksbaum, P. H., Haxton, D. J., Cryan, J. P.
2020; 102 (2)
- **Electronic Population Transfer via Impulsive Stimulated X-Ray Raman Scattering with Attosecond Soft-X-Ray Pulses.** *Physical review letters*
O'Neal, J. T., Champenois, E. G., Oberli, S., Obaid, R., Al-Haddad, A., Barnard, J., Berrah, N., Coffee, R., Duris, J., Galinis, G., Garratt, D., Glownia, J. M., Haxton, et al
2020; 125 (7): 073203
- **Tunable isolated attosecond X-ray pulses with gigawatt peak power from a free-electron laser** *NATURE PHOTONICS*
Duris, J., Li, S., Driver, T., Champenois, E. G., MacArthur, J. P., Lutman, A. A., Zhang, Z., Rosenberger, P., Aldrich, J. W., Coffee, R., Coslovich, G., Decker, F., Glownia, et al
2020; 14 (1): 30+
- **Attosecond transient absorption spooktroscopy: a ghost imaging approach to ultrafast absorption spectroscopy.** *Physical chemistry chemical physics : PCCP*
Driver, T., Li, S., Champenois, E. G., Duris, J., Ratner, D., Lane, T. J., Rosenberger, P., Al-Haddad, A., Averbukh, V., Barnard, T., Berrah, N., Bostedt, C., Bucksbaum, et al
2019
- **Development of ultrafast capabilities for X-ray free-electron lasers at the linac coherent light source** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
Coffee, R. N., Cryan, J. P., Duris, J., Helml, W., Li, S., Marinelli, A.
2019; 377 (2145)
- **Characterizing isolated attosecond pulses with angular streaking** *OPTICS EXPRESS*
Li, S., Guo, Z., Coffee, R. N., Hegazy, K., Huang, Z., Natan, A., Osipov, T., Ray, D., Marinelli, A., Cryan, J. P.
2018; 26 (4): 4531-47
- **Characterization of single-shot attosecond pulses with angular streaking photoelectron spectra** *PHYSICAL REVIEW A*
Zhao, X., Li, S., Driver, T., Van-Hung Hoang, Anh-Thu Le, Cryan, J. P., Marinelli, A., Lin, C. D.

2022; 105 (1)

- **Role of nuclear-electronic coupling in attosecond photoionization of H-2** *PHYSICAL REVIEW A*
Wang, A. L., Serov, V. V., Kamalov, A., Bucksbaum, P. H., Kheifets, A., Cryan, J. P.
2021; 104 (6)
- **Time-resolved pump-probe spectroscopy with spectral domain ghost imaging.** *Faraday discussions*
Li, S., Driver, T., Alexander, O., Cooper, B., Garratt, D., Marinelli, A., Cryan, J. P., Marangos, J. P.
2021
- **Transient resonant Auger-Meitner spectra of photoexcited thymine.** *Faraday discussions*
Wolf, T. J., Paul, A. C., Folkestad, S. D., Myhre, R. H., Cryan, J. P., Berrah, N., Bucksbaum, P. H., Coriani, S., Coslovich, G., Feifel, R., Martinez, T. J., Moeller, S. P., Mucke, et al
2021
- **Electron-ion coincidence measurements of molecular dynamics with intense X-ray pulses.** *Scientific reports*
Li, X., Inhester, L., Osipov, T., Boll, R., Coffee, R., Cryan, J., Gatton, A., Gorkhover, T., Hartman, G., Ilchen, M., Knie, A., Lin, M., Minitti, et al
2021; 11 (1): 505
- **Inner Valence Hole Migration in Isopropanol**
Alexander, O., Barillot, T., Cooper, B., Driver, T., Garratt, D., Li, S., Marinelli, A., Cryan, J. P., Marangos, J. P., LR25 Collaboration, IEEE
IEEE.2021
- **Characterizing Multiphoton Excitation Using Time-Resolved X-ray Scattering** *PHYSICAL REVIEW X*
Bucksbaum, P. H., Ware, M. R., Natan, A., Cryan, J. P., Glowonia, J. M.
2020; 10 (1)
- **Two-Photon Antenna Sensitization of Curium: Evidencing Metal-Driven Effects on Absorption Cross Section in f-Element Complexes.** *The journal of physical chemistry letters*
Pallares, R. M., Sturzbecher-Hoehne, M. n., Shivaram, N. H., Cryan, J. P., D'Aléo, A. n., Abergel, R. J.
2020: 6063–67
- **Strictly non-adiabatic quantum control of the acetylene dication using an infrared field.** *The Journal of chemical physics*
Liekhus-Schmaltz, C. n., Zhu, X. n., McCracken, G. A., Cryan, J. P., Martinez, T. J., Bucksbaum, P. H.
2020; 152 (18): 184302
- **On the limits of observing motion in time-resolved X-ray scattering** *PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES*
Ware, M. R., Glowonia, J. M., Natan, A., Cryan, J. P., Bucksbaum, P. H.
2019; 377 (2145)
- **Development of ultrafast capabilities for X-ray free-electron lasers at the linac coherent light source.** *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences*
Coffee, R. N., Cryan, J. P., Duris, J., Helml, W., Li, S., Marinelli, A.
2019; 377 (2145): 20180386
- **On the limits of observing motion in time-resolved X-ray scattering.** *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences*
Ware, M. R., Glowonia, J. M., Natan, A., Cryan, J. P., Bucksbaum, P. H.
2019; 377 (2145): 20170477
- **Ultrafast photodissociation dynamics and nonadiabatic coupling between excited electronic states of methanol probed by time-resolved photoelectron spectroscopy.** *The Journal of chemical physics*
Champenois, E. G., Greenman, L., Shivaram, N., Cryan, J. P., Larsen, K. A., Rescigno, T. N., McCurdy, C. W., Belkacem, A., Slaughter, D. S.
2019; 150 (11): 114301
- **Generation and Characterization of Attosecond Pulses from an X-ray Free-electron Laser**
Li, S., Rosenberger, P., Champenois, E. G., Driver, T., Bucksbaum, P. H., Coffee, R., Gatton, A., Hartmann, G., Helml, W., Huang, Z., Knurr, J., Kling, M. F., Lin, et al
IEEE.2019
- **Imaging CF3I conical intersection and photodissociation dynamics with ultrafast electron diffraction.** *Science (New York, N.Y.)*

- Yang, J., Zhu, X., Wolf, T. J., Li, Z., Nunes, J. P., Coffee, R., Cryan, J. P., Gühr, M., Hegazy, K., Heinz, T. F., Jobe, K., Li, R., Shen, et al
2018; 361 (6397): 64-67
- **Imaging CF3I conical intersection and photodissociation dynamics with ultrafast electron diffraction** *Science*
Yang, J., Zhu, X., Wolf, T. J., Li, Z., Nunes, J. P., Coffee, R., Cryan, J. P., Gühr, M., Hegazy, K., Heinz, T. F., Jobe, K., Li, R., Shen, et al
2018; 361 (6397): 64-67
 - **Ultrafast isomerization in acetylene dication after carbon K-shell ionization** *NATURE COMMUNICATIONS*
Li, Z., Inhester, L., Liekhus-Schmaltz, C., Curchod, B. E., Snyder, J. W., Medvedev, N., Cryan, J., Osipov, T., Pabst, S., Vendrell, O., Bucksbaum, P., Martinez, T. J.
2017; 8: 453
 - **Observing Femtosecond Fragmentation Using Ultrafast X-ray-Induced Auger Spectra** *APPLIED SCIENCES-BASEL*
Wolf, T. A., Holzmeier, F., Wagner, I., Berrah, N., Bostedt, C., Bozek, J., Bucksbaum, P., Coffee, R., Cryan, J., Farrell, J., Feifel, R., Martinez, T. J., McFarland, et al
2017; 7 (7)
 - **Ultrafast dynamics of the lowest-lying neutral states in carbon dioxide** *PHYSICAL REVIEW A*
Wright, T. W., Champenois, E. G., Cryan, J. P., Shivaram, N., Yang, C., Belkacem, A.
2017; 95 (2)
 - **Coherent control using kinetic energy and the geometric phase of a conical intersection.** *journal of chemical physics*
Liekhus-Schmaltz, C., McCracken, G. A., Kaldun, A., Cryan, J. P., Bucksbaum, P. H.
2016; 145 (14): 144304-?
 - **Involvement of a low-lying Rydberg state in the ultrafast relaxation dynamics of ethylene.** *The Journal of chemical physics*
Champenois, E. G., Shivaram, N. H., Wright, T. W., Yang, C. S., Belkacem, A., Cryan, J. P.
2016; 144 (1): 014303
 - **Coherent control using kinetic energy and the geometric phase of a conical intersection** *The Journal of Chemical Physics*
Liekhus-Schmaltz, C. E., McCracken, G. A., Kaldun, A., Cryan, J. P., Bucksbaum, P. H.
2016; 145: 144304
 - **Shapes and vorticities of superfluid helium nanodroplets** *SCIENCE*
Gomez, L. F., Ferguson, K. R., Cryan, J. P., Bacellar, C., Tanyag, R. M., Jones, C., Schorb, S., Anielski, D., Belkacem, A., Bernando, C., Boll, R., Bozek, J., Carron, et al
2014; 345 (6199): 906-909
 - **Helium superfluidity. Shapes and vorticities of superfluid helium nanodroplets.** *Science*
Gomez, L. F., Ferguson, K. R., Cryan, J. P., Bacellar, C., Tanyag, R. M., Jones, C., Schorb, S., Anielski, D., Belkacem, A., Bernando, C., Boll, R., Bozek, J., Carron, et al
2014; 345 (6199): 906-909
 - **Enhancement of strong-field multiple ionization in the vicinity of the conical intersection in 1,3-cyclohexadiene ring opening** *JOURNAL OF CHEMICAL PHYSICS*
Petrovic, V. S., Schorb, S., Kim, J., White, J., Cryan, J. P., Glowonia, J. M., Zipp, L., Broege, D., Miyabe, S., Tao, H., Martinez, T., Bucksbaum, P. H.
2013; 139 (18)
 - **Transient X-Ray Fragmentation: Probing a Prototypical Photoinduced Ring Opening** *PHYSICAL REVIEW LETTERS*
Petrovic, V. S., Siano, M., White, J. L., Berrah, N., Bostedt, C., Bozek, J. D., Broege, D., Chalfin, M., Coffee, R. N., Cryan, J., Fang, L., Farrell, J. P., Frasinski, et al
2012; 108 (25)
 - **Ultrafast absorption of intense x rays by nitrogen molecules** *JOURNAL OF CHEMICAL PHYSICS*
Buth, C., Liu, J., Chen, M. H., Cryan, J. P., Fang, L., Glowonia, J. M., Hoener, M., Coffee, R. N., Berrah, N.
2012; 136 (21)
 - **Ensemble of Linear Molecules in Nondispersing Rotational Quantum States: A Molecular Stopwatch** *PHYSICAL REVIEW X*
Cryan, J. P., Glowonia, J. M., Broege, D. W., Ma, Y., Bucksbaum, P. H.
2011; 1 (1)

- **Auger Electron Angular Distribution of Double Core-Hole States in the Molecular Reference Frame** *PHYSICAL REVIEW LETTERS*
Cryan, J. P., Glowonia, J. M., Andreasson, J., Belkacem, A., Berrah, N., Blaga, C. I., Bostedt, C., Bozek, J., Buth, C., DiMauro, L. F., Fang, L., Gessner, O., Guehr, et al
2010; 105 (8)
- **Field-free alignment in repetitively kicked nitrogen gas** *PHYSICAL REVIEW A*
Cryan, J. P., Bucksbaum, P. H., Coffee, R. N.
2009; 80 (6)