

# **UCLA**

## **UCLA Previously Published Works**

**Title**

Ultrafast Light-Matter and Quantum Dynamics

**Permalink**

<https://escholarship.org/uc/item/7c2519zj>

**Author**

Carbajo, Sergio

**Publication Date**

2023

## **Ultrafast Light-Matter and Quantum Dynamics**

1. Sergio Carbajo, Colonial Narratives in Urban Mapping and Dynamics, <https://escholarship.org/uc/item/95d8b0wr> (2023)
2. Sergio Carbajo, On Linguistics of (Inclusive) STEM Education, <https://escholarship.org/uc/item/28h491cm> (2023)
3. Sergio Carbajo (editor), On the Power of Storytelling and Logics to Affect Scientific Progress, <https://escholarship.org/uc/item/7v32m6v9> (2023)
4. Sergio Carbajo, On the Human-Machine Embodiment of Knowledge, <https://escholarship.org/uc/item/5f1152rz> (2023)
5. Ishigami, Izumi, et al. "Detection of a geminate photoproduct of bovine cytochrome c oxidase by time-resolved serial femtosecond crystallography." bioRxiv (2023).
6. Lu, Brittany, Keith Wernsing, and Sergio Carbajo. "Fiber-Amplified Pulses Beyond the Gain Narrowing Limit for Seeding an OPA." arXiv preprint arXiv:2305.03228 (2023).
7. Salamin, Yousef, and Sergio Carbajo. "Electron acceleration by exponentially-chirped laser pulses." (2023).
8. Carbajo, Sergio. "Queered Science & Technology Center: Volume 1." arXiv preprint arXiv:2304.12318 (2023).
9. Yeh, Syun-Ru, et al. "Detection of a geminate photoproduct of bovine cytochrome c oxidase by time-resolved serial femtosecond crystallography." bioRxiv (2023): 2023-05.
10. Adam, Virgile, et al. "Rational control of off-state heterogeneity in a photoswitchable fluorescent protein provides switching contrast enhancement." ChemPhysChem 23.19 (2022): e202200192.
11. Wolff, Alexander M., et al. "Mapping Protein Dynamics at High-Resolution with Temperature-Jump X-ray Crystallography." bioRxiv (2022): 2022-06.
12. Lemons, Randy, and Sergio Carbajo. "Phase retrieval and reconstruction of coherent synthesis by genetic algorithm." Journal of Physics: Photonics 4.2 (2022): 026001.
13. Lemons, Randy, et al. "Temporal shaping of narrow-band picosecond pulses via noncollinear sum-frequency mixing of dispersion-controlled pulses." Physical Review Accelerators and Beams 25.1 (2022): 013401.
14. Cesar, David, et al. "Electron beam shaping via laser heater temporal shaping." Physical Review Accelerators and Beams 24.11 (2021): 110703.
15. S. Carbajo, Structured Photonics in Light-Matter Interactions, Accelerators, and X-ray Lasers, IEEE IPC 2021 doi: 10.1109/IPC48725.2021.9592853.
16. Hussein, Rana, et al. "Structural dynamics in the water and proton channels of photosystem II during the S2 to S3 transition." Nature communications 12.1 (2021): 6531.

17. S. Carbajo, Light by design: emerging frontiers in ultrafast photon sciences and light-matter interactions, invited perspective article in [\*Journal of Physics: Photonics, Volume 3, Number 3\*](#) (2021)
18. Yong, Haiwang, et al. "Ultrafast X-ray scattering offers a structural view of excited-state charge transfer." *Proceedings of the National Academy of Sciences* 118.19 (2021): e2021714118.
19. Hirschman, Jack, et al. "Towards Real-time Adaptable Machine Learning-based Photoinjector Shaping." *CLEO: Science and Innovations*. Optica Publishing Group, 2021.
20. Grünbein et al., Effect of X-ray free-electron laser-induced shockwaves on hemoglobin microcrystals delivered in a liquid jet, *Nat Commun* 12, 1672 (2021)
21. Sorigué, Damien, et al. "Mechanism and dynamics of fatty acid photodecarboxylase." *Science* 372.6538 (2021): eabd5687.
22. Yun, Ji-Hye, et al. "Early-stage dynamics of chloride ion-pumping rhodopsin revealed by a femtosecond X-ray laser." *Proceedings of the National Academy of Sciences* 118.13 (2021): e2020486118.
23. Grünbein, Marie L., et al. "Observation of shock-induced protein crystal damage during megahertz serial femtosecond crystallography." *Physical Review Research* 3.1 (2021): 013046.
24. Lemons, R., Liu, W., Frisch, J. C., Fry, A., Robinson, J., Smith, S. R., & Carbajo, S. (2021). Integrated structured light architectures. *Scientific reports*, 11(1), 796.
25. Dods, Robert, et al. "Ultrafast structural changes within a photosynthetic reaction centre." *Nature* 589.7841 (2021): 310-314.
26. Sergio Carbajo, Jonathan C. Coopersmith, Geoffrey Cushman, Kevin Felch, John Lohr, Julie Mikula, Alan Rhodes and Edl Schamiloglu, Beamed Energy Propulsion for Low-Cost Launch to Earth Orbit: Paths for Progress, Aerospace Research Central DOI: 10.2514/6.2020-4173 (2020)
27. Hirschman, J., Lemons, R., Chansky, E., Steinmeyer, G., & Carbajo, S. (2020). Long-term hybrid stabilization of the carrier-envelope phase. *Optics Express*, 28(23), 34093-34103.
28. Ibrahim, Mohamed, et al. "Untangling the sequence of events during the S2→S3 transition in photosystem II and implications for the water oxidation mechanism." *Proceedings of the National Academy of Sciences* 117.23 (2020): 12624-12635.
29. Carbajo, Sergio. "Transient work function gating: A new photoemission regime." *Journal of Applied Physics* 128.2 (2020): 023102.
30. Yong, Haiwang, et al. "Observation of the molecular response to light upon photoexcitation." *Nature communications* 11.1 (2020): 2157.
31. Tang, Jingyi, et al. "Laguerre-gaussian mode laser heater for microbunching instability suppression in free-electron lasers." *Physical review letters* 124.13 (2020): 134801.
32. Wolff, Alexander M., et al. "Comparing serial X-ray crystallography and microcrystal electron diffraction (MicroED) as methods for routine structure determination from small macromolecular crystals." *IUCrJ* 7.2 (2020): 306-323.

33. Lemons, Randy, et al. "Carrier-envelope phase stabilization of an Er: Yb: glass laser via a feed-forward technique." *Optics letters* 44.22 (2019): 5610-5613.
34. Carbajo, Sergio, et al. "Lasers in Accelerator Science and Secondary Emission Light Source Technology." *Frontiers in Physics* 7 (2019): 162.
35. Ruddock, Jennifer M., et al. "A deep UV trigger for ground-state ring-opening dynamics of 1,3-cyclohexadiene." *Science advances* 5.9 (2019): eaax6625.
36. Yong, Haiwang, et al. "Scattering off molecules far from equilibrium." *The Journal of Chemical Physics* 151.8 (2019): 084301.
37. Stankus, Brian, et al. "Ultrafast X-ray scattering reveals vibrational coherence following Rydberg excitation." *Nature chemistry* 11.8 (2019): 716-721.
38. Nass Kovacs, Gabriela, Jacques-Philippe Colletier, Marie Luise Grünbein, Yang Yang, Till Stensitzki, Alexander Batyuk, Sergio Carbajo et al. "Three-dimensional view of ultrafast dynamics in photoexcited bacteriorhodopsin." *Nature communications* 10, no. 1 (2019): 3177.
39. M. H. Seaberg et al., CXI nanofocus characterization using single 2D grating interferometry, *X-Ray Free-Electron Lasers: Advances in Source Development and Instrumentation V*
40. Ruddock, Jennifer M., et al. "Simplicity beneath complexity: Counting molecular electrons reveals transients and kinetics of photodissociation reactions." *Angewandte Chemie* 131.19 (2019): 6437-6441.
41. C. Arnold, L. Inhester, S. Carbajo, R. Welsch, and R. Santra, Simulated XUV Photoelectron Spectroscopy of THz-pumped Liquid Water, *Journal of Chemical Physics* 150 (4), 044505 (2019)
42. Sierra, Raymond G., et al. "The macromolecular femtosecond crystallography instrument at the linac coherent light source." *Journal of synchrotron radiation* 26.2 (2019): 346-357.
43. Salamin, Yousef I., and Sergio Carbajo. "A simple model for the fields of a chirped laser pulse with application to electron laser acceleration." *Frontiers in Physics* 7 (2019): 2.
44. Kern, Jan, et al. "Structures of the intermediates of Kok's photosynthetic water oxidation clock." *Nature* 563.7731 (2018): 421-425.
45. Yong, Haiwang, et al. "Determining orientations of optical transition dipole moments using ultrafast X-ray scattering." *The journal of physical chemistry letters* 9.22 (2018): 6556-6562.
46. Liebster, Nikolas, et al. "Laguerre-Gaussian and beamlet array as second generation laser heater profiles." *Physical Review Accelerators and Beams* 21.9 (2018): 090701.
47. Nogly, Przemyslaw, et al. "Retinal isomerization in bacteriorhodopsin captured by a femtosecond x-ray laser." *Science* 361.6398 (2018): eaat0094.
48. Carbajo, Sergio, and Kipp Bauchert. "Power handling for LCoS spatial light modulators." *Laser Resonators, Microresonators, and Beam Control XX*. Vol. 10518. SPIE, 2018.
49. Philip Heimann, Stefan Moeller, Sergio Carbajo, Sanghoon Song, Georgi Dakovski, Dennis Nordlundb and David Fritz, Laser Power Meters as X-ray Intensity Monitors for LCLS-II, *Journal of Synchrotron Radiation*, <https://doi.org/10.1107/S1600577517014096> (2018)

50. Wong, Liang Jie, et al. "Laser-induced linear-field particle acceleration in free space." *Scientific reports* 7.1 (2017): 11159.
51. Coquelle, Nicolas, et al. "Chromophore twisting in the excited state of a photoswitchable fluorescent protein captured by time-resolved serial femtosecond crystallography." *Nature Chemistry* 10.1 (2018): 31-37.
52. Dods, Robert, et al. "From macrocrystals to microcrystals: a strategy for membrane protein serial crystallography." *Structure* 25.9 (2017): 1461-1468.
53. Ahr, Frederike, et al. "Narrowband terahertz generation with chirped-and-delayed laser pulses in periodically poled lithium niobate." *Optics letters* 42.11 (2017): 2118-2121.
54. Kaertner, Franz X., et al. "AXSIS: Exploring the frontiers in attosecond X-ray science, imaging and spectroscopy." *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* 829 (2016): 24-29.
55. Sergio Carbajo, Anne-Laure Calendron, Huseyin Cankaya, Paula Alcorta, Koustuban Ravi, Frederike Ahr, Xiaojun Wu, Arya Fallahi, Franz X Kärtner, Effective path towards relativistic transients at millimeter wavelengths, arxiv:1602.08136 (2016)
56. Carbajo, Sergio, et al. "Direct longitudinal laser acceleration of electrons in free space." *Physical Review Accelerators and Beams* 19.2 (2016): 021303.
57. Carbajo, Sergio, et al. "Efficient narrowband terahertz generation in cryogenically cooled periodically poled lithium niobate." *Optics letters* 40.24 (2015): 5762-5765.
58. Ravi, Koustuban, et al. "Theory of terahertz generation by optical rectification using tilted-pulse-fronts." *Optics express* 23.4 (2015): 5253-5276.
59. Graves, W. S., et al. "Compact x-ray source based on burst-mode inverse Compton scattering at 100 kHz." *Physical Review Special Topics-Accelerators and Beams* 17.12 (2014): 120701.
60. Wu, Xiaojun, et al. "Terahertz generation in lithium niobate driven by Ti: sapphire laser pulses and its limitations." *Optics letters* 39.18 (2014): 5403-5406.
61. Ravi, Koustuban, et al. "Limitations to THz generation by optical rectification using tilted pulse fronts." *Optics express* 22.17 (2014): 20239-20251.
62. Carbajo, Sergio, et al. "Efficient generation of ultra-intense few-cycle radially polarized laser pulses." *Optics letters* 39.8 (2014): 2487-2490.
63. Carbajo, S., et al. "Sequential single-shot imaging of nanoscale dynamic interactions with a table-top soft x-ray laser." *Optics letters* 37.14 (2012): 2994-2996.
64. Brizuela, Fernando, et al. "Imaging at the nanoscale with practical table-top EUV laser-based full-field microscopes." *IEEE Journal of Selected Topics in Quantum Electronics* 18.1 (2011): 434-442.