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Annual Report on QLMC Scientific Products 2026

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Abstract

This report summarizes the scientific publication record associated with the Quantum Light-Matter Cooperative (QLMC) and the research that preceded its establishment, covering 2015 through 5 October 2026. The record traces a progression from efficient terahertz generation and free-space electron acceleration to programmable structured light, carrier-envelope phase stabilization, nonlinear pulse synthesis, and advanced photoinjector and X-ray free-electron laser instrumentation. Collaborative publications in ultrafast X-ray scattering and serial femtosecond crystallography reveal transient molecular structures, photochemical pathways, and protein dynamics. More recent work expands into machine-learning-assisted optical modeling, inverse waveform design, gas-based four-wave mixing, quantum photonics, and imaging through scattering media. Conference contributions at CLEO, SPIE, Optica meetings, accelerator conferences, and American Physical Society meetings document the development and dissemination of these results. A reverse-chronological bibliography distinguishes journal publications and proceedings papers from conference abstracts, preprints, and accepted work. Additional appendices preserve presentation records lacking resolved publication metadata and related interdisciplinary scholarly outputs, without counting them as published QLMC research articles.

Scope and bibliographic conventions

This is a cumulative report, not a 2026-only publication tally. The author record used to define the search is Sergio Carbajo's Google Scholar profile. Direct enumeration of that profile was blocked during preparation; consequently, this report is a reconstructed bibliography, not a verified complete Scholar export. The September 2026 CV was cross-checked against institutional profiles, publisher records, conference archives, and public repositories. Some conference metadata remain unresolved and are identified separately.

The main bibliography contains 155 dated scientific records. Entries are ordered by publication year, newest first, then by author and title within each year; this does not assert exact day-level ordering where dates are unavailable. Final journal versions replace identified duplicate preprints, while distinct conference publications remain separate. MLA author conventions are used, including "et al." for works with three or more authors. DOI links, article numbers, and paper codes are supplied when recovered; unavailable fields are not invented.

QLMC was established in 2021; the 2015–2020 entries therefore document its scientific antecedents rather than publications issued by QLMC under that name. Publication status is stated for non-journal records. Appendix A contains 26 conference contributions whose final proceedings or abstract metadata were not independently resolved. Appendix B contains eight related interdisciplinary and institutional outputs, not assumed to be QLMC photonics publications or verified Scholar entries.

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2015

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Appendix A. Conference contributions requiring metadata confirmation

These contributions are documented in the September 2026 CV, but a final proceedings citation, archived abstract, or stable item-level locator was not independently recovered. They are retained for reconciliation, not counted as published proceedings papers. Citations reproduce the available author, title, event, and year information. No missing DOI, pagination, or paper number has been inferred.

2024

- A1. Carbajo, Sergio. “Next-Generation Attosecond Physics Instrumentation: From Frequency Combs to X-Ray Science.” *High-Power Laser Ablation VIII*, SPIE, 2024. *Conference contribution; publication metadata unverified.*

2023

- A2. Carbajo, Sergio. “Enabling Technologies and Applications of Strong-Field THz Radiation in Ultrafast and Nonequilibrium Dynamics.” *SPIE Optics + Photonics 2023*, 2023, presentation 12683-29, San Diego, California. *Conference contribution; publication metadata unverified.*
- A3. Lu, Brittany, et al. “Broadband Fiber-Amplified Pulses as OPA Sources.” *SPIE Optics + Photonics 2023*, 2023, presentation 12664-9, San Diego, California. *Conference contribution; publication metadata unverified.*
- A4. Varma, R., et al. “Bessel-Gaussian Laser Heater Mode for Microbunching Instability Suppression in Free-Electron Lasers.” *SPIE Optics + Photonics 2023*, 2023, San Diego, California. *Conference contribution; publication metadata unverified.*
- A5. Zhang, Hao, et al. “A New Integrated Machine Learning Framework for Advanced Photoemission.” *SPIE Optics + Photonics 2023*, 2023, presentation 12667-21, San Diego, California. *Conference contribution; publication metadata unverified.*

2022

- A6. Brown, Michael F., et al. “Hidden States in Rhodopsin Activation Seen with Femtosecond X-Ray Laser.” *Spence Symposium*, 2022, 11–13 Oct., Arizona State University. *Conference contribution; publication metadata unverified.*

2021

- A7. Hirschman, Jack, et al. “Hybrid Feed-Forward and Feedback Long-Term CEP Stabilization of All-Solid-State Laser.” *Solid State Lasers XXX: Technology and Devices*, vol. 11664, SPIE, 2021. *Conference contribution; publication metadata unverified.*
- A8. Hirschman, Jack, et al. “Towards Real-Time Programmable Photoinjector Laser Shaping.” *12th International Particle Accelerator Conference (IPAC2021)*, 2021. *Conference contribution; publication metadata unverified.*
- A9. Lemons, Randy, et al. “Generation and Reconstruction of Structured Light.” *Laser Resonators, Microresonators, and Beam Control XXIII*, vol. 11672, SPIE, 2021. *Conference contribution; publication metadata unverified.*

2020

- A10. Brown, M., et al. “Ultrafast Dynamics of Rhodopsin Visualized by X-Ray Lasers.” *Biophysics at the Dawn of Exascale Computers*, 2020, Hamburg, Germany. *Conference contribution; publication metadata unverified.*

- A11. Grant, T. D., et al. “Functional Dynamics of Membrane Proteins Revealed by X-Ray Scattering with a Femtosecond Free-Electron Laser.” *Biophysical Society Annual Meeting*, 2020, Feb.. *Conference contribution; publication metadata unverified.*

2019

- A12. Brown, M., et al. “Functional Dynamics of Membrane Proteins Revealed by X-Ray Scattering with a Femtosecond Free-Electron Laser.” *Nature Conference: Functional Dynamics—Visualizing Molecules in Action*, 2019, Nov., Arizona State University, Tempe. *Conference contribution; publication metadata unverified.*
- A13. Carbajo, Sergio. “Laser Shaping for Microbunching Instability Suppression and Seeded X-Ray Free Electron Emission.” *International Free Electron Laser Conference (FEL2019)*, 2019, Hamburg, Germany. *Conference contribution; publication metadata unverified.*
- A14. Salas-Estrada, L. A., et al. “Rhodopsin’s Ultra-Fast Activation Dynamics in Bilayer and Micelle Environments.” *Nature Conference: Functional Dynamics—Visualizing Molecules in Action*, 2019, Nov., Arizona State University, Tempe. *Conference contribution; publication metadata unverified.*
- A15. Weber, P., et al. “Ultrafast Chemical Reaction Dynamics of Free Molecules Using X-Ray Scattering.” *International Conference on Ultrafast Structural Dynamics*, 2019, Daejeon, South Korea. *Conference contribution; publication metadata unverified.*
- A16. Yong, Haiwang, et al. “Identifying Excited Electronic States from Ultrafast X-Ray Scattering.” *International Conference on Ultrafast Structural Dynamics*, 2019, Daejeon, South Korea. *Conference contribution; publication metadata unverified.*

2018

- A17. Brown, M., et al. “Femtosecond X-Ray Scattering of Membrane Proteins with a Free Electron Laser.” *5th International BioXFEL Conference*, 2018, New Orleans, Louisiana. *Conference contribution; publication metadata unverified.*
- A18. Carbajo, Sergio. “Advanced Laser Heater Shaping for Microbunching Instability Suppression in Free Electron Lasers.” *International Conference on Synchrotron Radiation Instrumentation*, 2018, Taipei, Taiwan. *Conference contribution; publication metadata unverified.*
- A19. Liu, Wei, et al. “Arbitrary Beam Generation by 4D Pulse Shaping.” *21st International Conference on Ultrafast Phenomena*, 2018, Hamburg, Germany. *Conference contribution; publication metadata unverified.*

2017

- A20. Heimann, Philip A., et al. “Laser Power Meters as X-Ray Intensity Monitors for LCLS-II.” *SPIE Optics + Optoelectronics*, 2017, Prague, Czech Republic. *Conference contribution; publication metadata unverified.*
- A21. Keathley, Phillip, et al. “High Harmonic Generation in Acetone for Ultrafast, Coherent, High-Flux EUV Sources.” *ATTO 2017*, 2017. *Conference contribution; publication metadata unverified.*
- A22. Kärtner, Franz X., et al. “Terahertz Accelerator Technology.” *Nonlinear Optics 2017*, 2017, Hawaii. *Conference contribution; publication metadata unverified.*
- A23. Xu, X., et al. “Time-Resolved Wide-Angle X-Ray Scattering Reveals Protein Quake in Rhodopsin Activation.” *61st Annual Meeting of the Biophysical Society*, 2017, New Orleans, Louisiana. *Conference contribution; publication metadata unverified.*

2016

- A24. Ruddock, J., et al. "Ultrafast Time-Resolved, Small-Angle Scattering of the Electrocyclic Ring-Opening Reaction of 1,3-Cyclohexadiene." *Ultrafast Imaging of Photochemical Dynamics: Faraday Discussions*, 2016. *Conference contribution; publication metadata unverified.*

2015

- A25. Carbajo, Sergio, et al. "Terahertz-Driven Relativistic Electron Source." *4th Banff Meeting on Structural Dynamics*, 2015, Banff, Canada. *Conference contribution; publication metadata unverified.*
- A26. Carbajo, Sergio. "Highly Efficient Narrowband Terahertz Generation in Cryogenically Cooled Periodically-Poled Lithium Niobate." *Ultrafast Optics X*, 2015, Huairou, China. *Conference contribution; publication metadata unverified.*

Undated item not assigned to the reporting period: Weber, P., et al. "Probing Chemistry in Space and Time: Molecular Structures in Transient States." Pacificchem. The CV supplies no year or publication locator.

Appendix B. Related interdisciplinary and institutional scholarly outputs

The following CV-listed works are retained separately because they concern broader scholarly, educational, or institutional activity. Their inclusion does not establish that they are QLMC scientific papers or that every item is indexed by Google Scholar. They are not included in the 155-record scientific bibliography.

2026

- B1. Carbajo, Sergio. *LinkLA: Moving LA Forward*. Queered Science & Technology Center, University of California, Los Angeles, 2026. *Institutional report*.

2025

- B2. Carbajo, Sergio. “Nurturing Deeper Ways of Knowing in Science.” *Issues in Science and Technology*, vol. 41, no. 2, 2025, p. 71. <https://doi.org/10.58875/jkrw4525>. *Essay*.

2024

- B3. Lee, Ethan, et al. “Education for a Future in Crisis: Developing a Humanities-Informed STEM Curriculum.” *eScholarship, University of California*, 2024. <https://escholarship.org/uc/item/8mk2w7kp>. *Institutional publication*.

2023

- B4. Carbajo, Sergio, editor. *Colonial Narratives in Urban Mapping and Dynamics*. Queered Science & Technology Center, University of California, Los Angeles, 2023. *Edited institutional publication*.
- B5. Carbajo, Sergio, editor. *On Linguistics of (Inclusive) STEM Education*. Queered Science & Technology Center, University of California, Los Angeles, 2023. *Edited institutional publication*.
- B6. Carbajo, Sergio, editor. *On the Human-Machine Embodiment of Knowledge*. Queered Science & Technology Center, University of California, Los Angeles, 2023. *Edited institutional publication*.
- B7. Carbajo, Sergio, editor. *On the Power of Storytelling and Logics to Affect Scientific Progress*. Queered Science & Technology Center, University of California, Los Angeles, 2023. *Edited institutional publication*.
- B8. Carbajo, Sergio. “Queered Science & Technology Center: Volume 1.” *arXiv*, 2023, arXiv:2304.12318. <https://arxiv.org/abs/2304.12318>. *Institutional collection*.