

## **CONTACT INFORMATION**

Professor Marcos Dantus  
University Distinguished Professor  
MSU Foundation Research Professor

Department of Chemistry  
Department of Electrical and Computer Engineering  
Department of Physics and Astronomy

578 South Shaw Lane Room 58  
Michigan State University  
East Lansing, MI 48824

Phone: (517) 353-1191  
Email: [dantus@msu.edu](mailto:dantus@msu.edu)  
Web: [www2.chemistry.msu.edu/faculty/dantus/](http://www2.chemistry.msu.edu/faculty/dantus/)

**Personal information:** Born in Mexico; U.S. citizen.

## **CURRENT POSITIONS AND AFFILIATIONS**

- Professor, Department of Electrical and Computer Engineering, Michigan State University (2024–present)
- MSU Foundation Professor, Michigan State University (2015–present)
- University Distinguished Professor, Michigan State University (2015–present)
- Adjunct Professor, Department of Physics and Astronomy, Michigan State University (2002–present)
- Professor, Department of Chemistry, Michigan State University (2002–present)

## **BRIEF RESEARCH OVERVIEW**

Experimental chemical physicist working at the interface of ultrafast laser science, strong-field dynamics, and adaptive pulse shaping. My research focuses on how intense, shaped femtosecond laser fields accelerate electrons and drive the earliest stages of ionization, charge migration, and structural change in complex molecules, materials, and condensed phases. By accessing regimes where field-accelerated electron impact and recollision, rather than simple multiphoton absorption, govern the response, my group maps and controls cascaded ionization and fragmentation pathways and connects early-time electron dynamics to observables ranging from time-resolved mass spectra to material damage and modification. This work brings femtosecond temporal control to traditionally “static” measurements and informs new strategies for strong-field diagnostics, waveform-engineered interactions, and optimized high-intensity laser–matter coupling.

## **RESEARCH INTERESTS**

- Radiation–biomolecule interactions, ionization-induced damage, and electron-impact–initiated chemistry
- Ultrafast time-resolved spectroscopy and imaging of chemical, biological, and materials systems
- Ultrafast strong-field dynamics and cascaded electron-driven transformations in complex molecular and condensed-phase systems
- Femtosecond time-resolved intracluster reaction dynamics initiated by strong-field electron recollision
- MIIPS-enabled femtosecond pulse shaping, high-contrast few-cycle sources, and adaptive control of laser–matter interactions

## EDUCATION

- **Postdoctoral Research Fellow**, California Institute of Technology, 1993
  - Advisor: Ahmed H. Zewail
  - Ultrafast electron diffraction for real-time structural studies of chemical reactions
- **Ph.D. in Chemical Physics**, California Institute of Technology, 1991 (with A.H. Zewail)
  - Dissertation: *Femtosecond Transition-State Spectroscopy of Chemical Reactions*
  - Awards: Milton and Francis Clauser Doctoral Prize; ACS Nobel Laureate Signature Award
- **B.A. & M.A. in Chemistry**, Brandeis University, 1982-1985

## ACADEMIC AND PROFESSIONAL POSITIONS

- 2024– Professor, Department of Electrical and Computer Engineering, Michigan State University
- 2015– MSU Foundation Professor, Michigan State University
- 2015– University Distinguished Professor, Michigan State University
- 2002– Professor, Department of Chemistry, Michigan State University
- 2001– Adjunct Professor, Department of Physics and Astronomy, Michigan State University
- 1999–2002 Associate Professor, Department of Chemistry, Michigan State University
- 1993–1999 Assistant Professor, Department of Chemistry, Michigan State University
- 1991–1993 Postdoctoral Research Fellow, California Institute of Technology

## HONORS AND AWARDS

- 2023 Ahmed Zewail Award in Ultrafast Science and Technology
- 2020 Modern Optics and Spectroscopy Seminar, MIT
- 2019 Richard B. Bernstein Lecture, University of California, Los Angeles
- 2019 Technology Transfer Achievement Award, Michigan State University
- 2015 MSU Foundation Chair, Michigan State University
- 2015 University Distinguished Professor, Michigan State University
- 2014 Fellow, National Academy of Inventors
- 2014 Fellow, American Physical Society
- 2014 Fellow, Optical Society of America (Optica)
- 2013 Inventor of the Year Award, Michigan State University
- 2012 CLEO/Laser Focus World Innovation Award Winner (development of femtoAdaptiv)
- 2009 PhAST/Laser Focus World Innovation Award Winner (development of femtoFit)
- 2008 University Distinguished Faculty Award, Michigan State University
- 2007 Laser Focus World Commendation for Excellence in Technical Communications
- 2007 PhAST/Laser Focus World Innovation Award Honorable Mention (development of MIIPS)
- 2006 College of Natural Sciences Distinguished Faculty Award, Michigan State University
- 2001 Plenary Speaker, 8th International Workshop on Femtosecond Technology, Tsukuba, Japan
- 2001 Featured in ACS 125th Anniversary Issue of *Chemical & Engineering News*
- 1998 Camille Dreyfus Teacher-Scholar Award
- 1998 Alfred P. Sloan Research Fellow
- 1996 Lilly Teaching Fellowship
- 1995 Packard Fellowship for Science and Engineering
- 1995 Beckman Young Investigator Award
- 1994 General Electric Foundation Faculty Award
- 1993 Camille and Henry Dreyfus New Faculty Award
- 1992 Nobel Laureate Signature Award for Graduate Education in Chemistry
- 1991 Milton and Francis Clauser Doctoral Prize, California Institute of Technology
- 1991 Herbert Newby McCoy Award, California Institute of Technology
- 1985 Phi Beta Kappa, Brandeis University

## PUBLICATIONS

### Publication summary

271 publications, 15,065 citations; h-index 64; i10-index 195 (Google Scholar, including patent citations).

- **Full publication list:** see attached document . Appendix – A
- **10 most significant publications.** Appendix - B

## PATENTS AND INVENTION DISCLOSURES

### Patent summary

37 issued patents, 5 pending patents, and 7 invention disclosures (2022–2026).

- **Full patent portfolio:** see attached document. Appendix - C

## RESEARCH FUNDING

Dantus has maintained continuous external funding for cutting-edge experimental laboratories in ultrafast science since 1993, with support from major federal agencies and industrial partners. A detailed funding history is provided in the attached “Funding History (1993–2025)” document. Appendix -D

## ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER

- **Founder, Chairman of the Board, and CTO,** Biophotonic Solutions Inc. (2003–2017)  
Commercialized MIIPS-based femtosecond pulse shaping and measurement technology for scientific, medical, and industrial laser systems. Company later acquired by IPG Photonics (2016).
- **Founder and Member of the Board of Directors,** KTM Industries Inc. (1998–2004)  
Developed and commercialized biodegradable foam materials for protective packaging; company later acquired by TemperPack (2022).
- **Director of Research and Development,** Total Power Inc. (starting in 1998)  
Advisor for fuel additive technologies aimed at improving efficiency and reducing emissions; products used primarily in the mining industry.
- **Consulting,** Teledyne Technologies. (2023-2026)  
Technical consulting related to nonlinear spectroscopy implementations.

## INVITED TALKS AND KEYNOTES (SELECTED 2020–2026)

- **Complete invited talks and keynotes list 2000-2026:** see attached document. Appendix -E
- 2026 – Invited Speaker, Advanced Optical Metrology and Ultrafast Dynamics, Princeton University, Princeton, NJ.
- 2025 – Invited Speaker, Viaje Cuántico, Virtual Conference broadcasted through Latin America.
- 2025 – Invited Speaker, Department of Physics, Michigan State University, East Lansing MI.
- 2024 – Invited Speaker, Department of Photon Science, Stanford University, Menlo Park CA.
- 2024 – Invited Talk, Photodynamics 2024, Santiago Chile.
- 2024 – Invited Talk, Ultrafast Nonlinear Optics and Optical Spectroscopy, IISER Mohali, India.
- 2023 – Invited Speaker, Department of Chemistry, Tel Aviv University, Tel Aviv, Israel
- 2023 – Invited Speaker, Department of Chemistry, Colorado State University, Fort Collins, CO.
- 2023 – Invited Speaker, Department of Chemistry, University of Colorado Boulder, Boulder, CO.
- 2023 – Presentation as recipient of the Ahmed H. Zewail Award in Ultrafast Science and Technology
- 2023 – Invited Speaker, Department of Chemistry, University of California San Diego, San Diego, CA.
- 2023 – Invited Speaker, Department of Physics, University of Konstanz, Konstanz, Switzerland.
- 2023 – Invited talk, Femtochemistry 15 Conference, Berlin, Germany.

## MARCOS DANTUS – Curriculum Vitae (Updated 5/3/2026)

- 2023 – Invited talk, XVII Iberian Joint Meeting on Atomic and Molecular Physics (IBER2023) Conference, Coimbra, Portugal
- 2022 – Invited Talk, SLAC, Stanford University, Stanford CA.
- 2022 – Invited Speaker, Gordon Conference, Molecular Dynamics
- 2022 – Invited Speaker, MOLEC 2022, Hamburg, Germany.
- 2021 – Invited talk Center for Free-Electron Laser Science - Deutsches Elektronen-Synchrotron DESY
- 2020 – Invited to present a Modern Optics and Spectroscopy Seminar at MIT, Cambridge, MA.

### TEACHING EXPERIENCE

- Teaching awards: Lilly Teaching Fellowship
- Camille Dreyfus Teacher-Scholar Award.

### Undergraduate courses

- CEM 141 – General Chemistry
- CEM 142 – General and Inorganic Chemistry
- CEM 152 – Principles of Chemistry
- CEM 181H – Honors Chemistry I
- CEM 186 – Honors General Chemistry Laboratory
- CEM 383 – Introductory Physical Chemistry I

### Graduate courses

- CEM 881 – Atomic and Molecular Structure
- CEM 882 – Kinetics and Spectroscopic Methods
- CEM 987 – Selected Topics in Physical Chemistry I
  - Ultrafast Nonlinear Spectroscopy
- CEM 988 – Selected Topics in Physical Chemistry II
  - Time-Resolved Quantum Mechanics (2024, 2025)
- CEM 991 – Quantum Chemistry and Statistical Thermodynamics I

### Invited courses outside my home institution

- Guest lecture, Multiphoton Intrapulse Interference Phase Scan, Princeton University (2026)
- Ultrafast Pulse Compression, Shaping, and Characterization for OSA, CLEO (2012-2026)
- Tutorial on Nonlinear Optical Spectroscopy Trace Explosives Detection Workshop TED2016
- Chautauqua on Nonlinear Optics summer short course run annually at Purdue 2014
- Ultrafast Pulse Shaping 3-day Workshops, MSU August 2010, 2011, 2012, 2013
- Short Course on Ultrafast pulse shaping and pulse compression for SPIE Photonics West (2012-2014)
- CoCoChem Summer School, (3 days of lectures) University College London, invited lecturer 2009
- Optics and Photonics School, (2 days of lectures) Sao Carlos, Brazil 2008
- Advanced Optical Imaging Workshop, Melbourne, Australia 2007
- Coherent control of nonlinear optical excitation,” iNano Workshop, Aalborg, Denmark, 2003

### MENTORING AND SUPERVISION

- Supervised numerous (>30) Ph.D. and M.S. students in chemistry, ECE, and physics working on ultrafast science, pulse shaping, and strong-field dynamics.
- Mentored a large cohort of postdoctoral researchers (>20) who have gone on to careers in academia, industry, and national laboratories.
- Supervised many undergraduate researchers (>50); several have co-authored publications and pursued graduate study in physical chemistry, optics, and related disciplines.

## PROFESSIONAL SERVICE

### Professional activities and societies

- 2022–present APS Physicist To-Go and Quantum To-Go lecturer
- 2022–present Consultant, Teledyne FLIR
- 2022–2024 Expert witness
- 2017–2021 Consultant, IPG Photonics Inc.
- 2015–present International Advisory Committee and Organizer, FEMTO Conferences
- 2012 DARPA Workshop Program in Ultrafast Laser Science and Engineering (PULSE)
- 2012 Committee of Atomic, Molecular and Optical Sciences, National Research Council
- 2010–present Editorial Board Member, *Journal of Raman Spectroscopy*
- 2007–2013 Advisory Editorial Board Member, *Chemical Physics Letters*
- 2006–2012 Board of Advisors, *Journal of Physical Chemistry*
- 2004 President, Phi Beta Kappa, Epsilon Chapter of Michigan
- 2004 Member, Ultrafast Dynamics Committee, IQEC
- 2004 Member, Steering Committee, Ultrafast X-Ray Science
- 2004 DARPA Workshop on Arbitrary Waveform Generation
- 2003 Vice-President, Phi Beta Kappa, Epsilon Chapter of Michigan
- 2002 Invited Scientist, Scientist Helping America Conference, USSOCOM

### SERVICE TO DEPARTMENT, UNIVERSITY, AND PROFESSION (SELECTED)

#### Departmental and college service

- Member of 11–12 graduate guidance committees every year
- Graduate Advising Committee (multiple instances)
- Department Safety Committee (multiple instances)
- Reappointment and Promotions Committee (multiple instances)
- Awards Committee (multiple instances)
- CNS / College Reappointment and Promotions Committee
- University Hearing Office / University Hearing Board (1999–2001; 2005–2007)
- Diversity, Equality, and Inclusivity (DEI) Committee
- Vice President (2003–2004) and President (2004–2005), Phi Beta Kappa, MSU Chapter.
- University Research Corridor Tour (MSU), faculty participant
- Member, Search Committee for the Vice President for Research (2012)
- Associate Chair for Research, Department of Chemistry (2024-2025)
- Access, Community, and Excellence Committee (2025-2026)
- Participated in a PR video for the Honors College (2026)
- Participated in the Scholars at the Table Fundraising event for the Honors College (2026)

#### Editorial and advisory boards

- Member of the Advisory Committee for the Center for Advanced Reaction Dynamics (CARD), Korea.
- Advisory Board / Board of Advisors, *Chemical Physics Letters*
- Editorial Board / Advisory Board, *Journal of Raman Spectroscopy*
- Board of Advisors, *Journal of Physical Chemistry*
- Member, Scientific Advisory Board for a MURI Center on Dynamic Magneto-Optics (DYNAMO), University of Michigan.
- Guest Editor for special issues on femtochemistry and ultrafast lasers in *Chemical Reviews* and *Optical Engineering* (2002–2004, 2013–2014)

#### Conference and community organization

- Organizer, Nobel Prize Symposium in honor of Ahmed H. Zewail, ACS National Meeting, Washington, DC (2001)

## MARCOS DANTUS – Curriculum Vitae (Updated 5/3/2026)

- International organizing committee, Femtochemistry Conferences (multiple years including 2009, 2011, FEMTO14 in Shanghai, FEMTO15 in Berlin)
- Organizer and co-organizer of specialized workshops (e.g., NSF Mid-Scale Instrument Development Workshop, FEIS-2, Laser Probing of Matter meetings), including responsibility for program design, funding, and speaker selection
- Organizer, annual MIIPS and Ultrafast Pulse Shaping Workshops, Michigan State University (2009–2013)
- Organizer, Femtochemistry 13 Conference, Cancun, Mexico (2017).

### Grant, panel, and review service

- Book reviewer for J. Am. Chem. Soc. (review of “Femtosecond Laser Pulses: Principles and Experiments,” 1999).
- Regular referee for leading journals including Science, Nature, Nature Photonics, Optica, Journal of Chemical Physics, Journal of Physical Chemistry, Optics Letters, Optics Express, Physical Review Letters, and others.
- Reviewer and panelist for major funding programs at NSF (Chemistry, AMO Physics, CAREER, MRI, STC, SBIR), NIH, DOE (BES/AMOS), AFOSR, ONR, ARO, ARPA-E, and international agencies (e.g., US–Israel Binational Science Foundation, Canada Foundation for Innovation, Israeli Science Foundation).
- External reviewer for faculty promotion and tenure cases at U.S. and international universities (approximately one per year).
- Panelist and reviewer for NSF (including Major Research Instrumentation panels, and undisclosed major award committees)
- Reviewer for DOE, AFOSR, Argonne, Stanford Linear Accelerator, and other national labs/agencies
- Reviewer for the Israeli Science Foundation and Canadian Research Council
- Industrial/technology advisory roles
- Scientific Advisor to Total Power Inc. (fuel additives for reduced emissions)

### OUTREACH AND PUBLIC ENGAGEMENT (SELECTED)

- Extensive K–12 and community outreach, including multiple hands-on chemistry presentations and career talks at local schools and “Meet a Scientist” events.
- Keynote Address, Phi Beta Kappa, “Teaching after the information revolution” (2003).
- Public talks and panels on innovation and entrepreneurship for MSU Foundation, Michigan Economic Development Corporation, and regional “Smart Zone” initiatives.
- Numerous national and international media interviews on ultrafast laser–based standoff detection of explosives and related technologies (2011, 2013).
- Invited panelist, Michigan Policy Conference (Mackinac Island, 2012)
- Invited speaker at International Mining Expo (IMEX, 2014)
- High-level Pentagon meeting on reducing fuel consumption and emissions (2014).
- Invited public presentation for ‘Viaje Quantico,’ a series of speakers and activities celebrating the 100 years of Quantum Mechanics. Universidad Autonoma de Mexico, Mexico (2025)
- Presented a hands-on quantum demonstration, the interferometer was built by a 6<sup>th</sup> grade student that worked with me for 6 months.

### LANGUAGES

- Spanish (C2), English (C2), Hebrew (C1); French (B1), Portuguese (B1), Italian (A2), Chinese (A1), Japanese (A1).

### PROFESSIONAL MEMBERSHIPS

- American Chemical Society (ACS), American Physical Society (APS), Optica, Institute of Electrical and Electronics Engineers (IEEE), American Association for the Advancement of Science (AAAS), Real Sociedad Española de Física

## Appendix A – Full Publications List, M. Dantus

### Book:

M. Dantus, *Femtosecond Laser Shaping: From Laboratory to Industry*, 1st ed., CRC Press, Boca Raton (2017).

### Scientific Publications: (Selected Optics and Ultrafast Laser Technology Publications in Appendix B)

271. J. Stamm, Y. Wang, A. Mehmood, J. Suchan, X. Cheng, M. P. Minitti, S. Cheng, K. A. Larsen, I. Gabalski, Y. Liu, M. Dantus, T. J. A. Wolf, B. G. Levine, A. Natan, “Real-space emergence of statistical unimolecular kinetics in a photoacid generator,” ChemRxiv (2026). DOI: 10.26434/chemrxiv.15000365
- 270 S. Anishchik, N. Katturi, J. Sandhu, M. Dantus, “Size-Dependent Femtosecond Proton Transfer in Protonated Methanol Clusters,” Phys. Chem. Chem. Phys. (2026). DOI: 10.1039/D5CP04925C
269. S. Kwon, N. Katturi, B. Moreno, C. Cardenas, M. Dantus, “Ultrafast cation-dication dynamics in ammonia borane: H-migration to roaming H<sub>2</sub> and reduced H<sub>3</sub><sup>+</sup> formation under strong-field ionization,” J. Phys. Chem. A (2026). DOI: 10.1021/acs.jpca.5c07228
268. S. V. Anishchick, M. Dantus, “Nanometer-Scale 3D Microscopy in a Single Shot,” Optics & Photonics News 36, 37 (2025)
267. S. V. Anishchik, S. P. F. Roberts, S. S. Nicley, M. Dantus, “Single-shot 3D optical microscope with nanometer longitudinal resolution based on a Linnik interferometer,” Proc. SPIE 13325, 1332509 (2025).
266. M. Dantus, “Detecting the Feeble Electromagnetic Emissions from Cancer Biomarkers,” ACS Cent. Sci. 11, 505 (2025).
265. S. Kwon, J. Stamm, M. Dantus, “Ultrafast Dynamics and Rearrangement of the EUV Photoacid Generator Phenyl Triflate,” J. Phys. Chem. Lett. 16, 3397 (2025). Featured in the journal cover.
264. J. Stamm, S. S. Priyadarsini, S. Sandhu, A. Chakraborty, J. Shen, S. Kwon, J. Sandhu, C. Wicka, A. Mehmood, B. G. Levine, P. Piccuch, M. Dantus, “Factors governing H<sub>3</sub><sup>+</sup> formation from methyl halogens and pseudohalogens,” Nat. Commun. 16, 410 (2025).
263. J. Stamm, S. Kwon, M. Dantus, “Determining Key Factors for the Open-Loop Control of Molecular Fragmentation Using Shaped Strong Fields,” J. Phys. Chem. Lett. 15, 9099 (2024).
262. E. Prieto Zamudio, R. Das, N. Krishnakanth Katturi, J. Stamm, J. Sandhu, S. Kwon, M. Minasian, M. Dantus, “Enhanced strong-field ionization and fragmentation of methanol using non-commensurate field,” J. Phys. Chem. A. 128, 9099 (2024).
261. M. Dantus, “Ultrafast studies of elusive chemical reactions in the gas phase,” Science 385, eadk1833 (2024).
260. S. Anishchik, M. Dantus, “Optical microscope with nanometer longitudinal resolution based on a Linnik interferometer,” J. Opt. 26 115602 (2024).
259. J. Stamm, S. Kwon, S. Sandhu, J. Sandhu, B. Levine, M. Dantus, “Coherence mapping to identify the intermediates of multi-channel dissociative ionization,” Commun. Chem. 7, 103 (2024).
258. M. Dantus, “Tracking Molecular Fragmentation in Electron-Ionization Mass Spectrometry with Ultrafast Time Resolution,” Acc. Chem. Res. 57, 033003 (2024). Featured in the journal cover.
257. T. Severt, E. Weckworth, B. Kaderiya, P. Feizollah, B. Jochim, K. Borne, F. Ziaee, K. Raju, K. Carnes, M. Dantus, D. Rolles, A. Rudenko, E. Wells, I. Ben-Itzhak, “Initial-site characterization of hydrogen migration following strong-field double-ionization of ethanol,” Nat. Comm. 15, 74 (2024).
256. J. Stamm, S. Kwon, S. Sandhu, M. Shaik, R. Das, J. Sandhu, B. Curenton, C. Wicka, B. G. Levine, L. Sun, M. Dantus, “The Surprising Dynamics of the McLafferty Rearrangement,” J. Phys. Chem. Lett. 14, 10088-10093 (2023). Featured in the journal cover.
255. S. Kwon, S. Sandhu, M. Shaik, J. Stamm, J. Sandhu, R. Das, C. V. Hetherington, B. G. Levine, M. Dantus, “What is the mechanism of H<sub>3</sub><sup>+</sup> Formation from Cyclopropane?,” J. Phys. Chem. A. 127, 8633-8638 (2023).
254. M. Dantus, “Insights into ultrafast H<sub>3</sub><sup>+</sup> formation provide a glimpse into primordial chemistry,” Nat. Chem. 15, 1202-1203 (2023).
253. J. Stamm, L. DeJesus, A. Jones, M. Dantus, “Quantitative Identification of Nonpolar Perfluoralkyl Substances by Mass Spectrometry”, J. Phys. Chem. 126, 8851-8858 (2022).
252. J. Stamm, S. Li, B. Jochim, S. Yuwono, S. Priyadarsini, P. Piccuch, M. Dantus, “Femtosecond intramolecular rearrangement of the CH<sub>3</sub>NCS radical cation”, J. Chem. Phys. 157, 214304 (2022).
251. S. Li, B. Jochim, J. Stamm, D. Peng, H. Shao, J. M. N. Djiokap, M. Dantus, “Pulse shaping in strong-field ionization: Theory and experiments,” Phys. Rev. A 105, 053105 (2022).
250. B. Jochim, L. DeJesus, M. Dantus, “Ultrafast disruptive probing: simultaneously keeping track of tens of reaction pathways,” Rev. Sci. Instr. 93, 033003 (2022).
249. J. Lahiri, S. Sandhu, B. G. Levine, M. Dantus, “Human Serum Albumin Dimerization Enhances the S2 Emission of Bound Cyanine IR806,” J. Phys. Chem. Lett. 13, 1825-1832 (2022).

## Appendix A – Full Publications List, M. Dantus

248. B. Capistran, S. Yuwono, M. Moemeni, S. Maity, A. Vahdani, B. Borhan, J. Jackson, P. Piecuch, M. Dantus, G. J. Blanchard, "Intramolecular Relaxation Dynamics Mediated by Solvent-Solute Interactions of Substituted Fluorene Derivatives. Solute Structural-Dependence," *J. Phys. Chem. B* 125, 12486–12499 (2021).
247. B. Capistran, S. Yuwono, M. Moemeni, S. Maity, A. Vahdani, B. Borhan, J. Jackson, P. Piecuch, M. Dantus, G. J. Blanchard, "Excited State Dynamics of a Substituted Fluorene Derivative. The Central Role of Hydrogen Bonding Interactions with the Solvent," *J. Phys. Chem. B* 125, 12242–12253 (2021).
246. M. Laboe, J. Lahiri, N. Mohan T. M., F. Liang, B. Levine, W. Beck, M. Dantus, "Linear and Nonlinear Optical Processes Controlling  $S_2$  and  $S_1$  Dual Fluorescence in Cyanine Dyes," *J. Phys. Chem. A* 125, 9770–9784 (2021).
245. M. Dantus, "Ahmed Zewail: 1946–2016," Biographical Memoirs, the National Academy of Sciences (2021).
244. J. Lahiri, S. H. Yuwono, I. Magoulas, M. Moemeni, B. Borhan, G. J. Blanchard, P. Piecuch and M. Dantus, "Controlling Quantum Interference between Virtual and Dipole Two Photon Optical Excitation Pathways Using Phase-Shaped Laser Pulses," *J. Phys. Chem. A* 125, 7534–7544 (2021).
243. J. Stamm, and M. Dantus, "A comparison of strategies for state-selective coherent Raman excitation," *J. Raman Spectroscopy (Special issue)* 29, 14314–14325 (2021).
242. S. Li, B. Jochim, J. E. Jackson, and M. Dantus "Femtosecond dynamics and coherence of ionic retro-Diels–Alder reactions," *J. Chem. Phys.* 155, 044303 (2021).
241. J. Stamm, J. Benel, E. Escoto, G. Steinmeyer and M. Dantus, "Milliradian precision ultrafast pulse control for spectral phase metrology," *Optics Express* 29, 14314–14325 (2021).
240. J. Kline and M. Dantus, "The transition dipole moment representation and spectral phasors," *Proc. SPIE* 11648, 1164813 (2021).
239. J. Kline and M. Dantus, "Chemical complexity of the retina addressed by novel phasor analysis of unstained multimodal microscopy," *Chem. Phys.*, 543, 111091 (2021).
238. J. Lahiri, M. Moemeni, J. Kline, I. Magoulas, S. H. Yuwono, M. Laboe, J. Shen, B. Borhan, P. Piecuch, J. E. Jackson, G. J. Blanchard, and M. Dantus, "Isoenergetic Two-Photon Excitation Enhances Solvent-to-Solute Excited-State Proton Transfer," *J. Chem. Phys.*, 153, 224301 (2020).
237. J. Lahiri, M. Moemeni, I. Magoulas, S. H. Yuwono, J. Kline, B. Borhan, P. Piecuch, J. E. Jackson, G. J. Blanchard, and M. Dantus, "Steric effects in light-induced solvent proton abstraction," *Phys. Chem. Chem. Phys.* 22, 19613–19622 (2020).
236. J. Lahiri, J. Kline and M. Dantus, "Ultrafast pulse metrology for industrial applications," *Proc. SPIE* 11270, 112700K (2020).
235. S. Li, D. Sierra-Costa, M. J. Michie, I. Ben-Itzhak and M. Dantus, "Control of electron recollision and molecular nonsequential double ionization," *Comm. Phys.* 3, 35 (2020).
234. J. Lahiri, M. Moemeni, J. Kline, B. Borhan, I. Magoulas, S. H. Yuwono, P. Piecuch, J. E. Jackson, M. Dantus and G. J. Blanchard, "Proton Abstraction Mediates Interactions between the Super Photobase FR0-SB and Surrounding Alcohol Solvent," *J. Phys. Chem. B* 123, 8448 (2019).
233. A. Ghanbarpour, M. Nairat, M. Nosrati, E. M. Santos, C. Vasileiou, M. Dantus, B. Borhan, and J. H. Geiger, "Mimicking Microbial Rhodopsin Isomerization in a Single Crystal," *J. Am. Chem. Soc.* 141, 1735 (2019).
232. M. J. Michie, N. Ekanayake, N. P. Weingartz, J. Stamm, and M. Dantus, "Quantum coherent control of  $H_3^+$  formation in strong fields," *J. Chem. Phys.* 150, 044303 (2019).
231. N. Ekanayake, M. Nairat, N. P. Weingartz, M. J. Michie, B. G. Levine, and M. Dantus, "Substituent effects on  $H_3^+$  formation via  $H_2$  roaming mechanisms from organic molecules under strong-field photodissociation," *J. Chem. Phys.* 149, 244310 (2018).
230. N. Ekanayake, T. Severt, M. Nairat, N. P. Weingartz, B. M. Farris, B. Kaderiya, P. Feizollah, B. Jochim, F. Ziaee, K. Borne, K. Raju P., K. D. Carnes, D. Rolles, A. Rudenko, B. G. Levine, J. E. Jackson, I. Ben-Itzhak, and M. Dantus, " $H_2$  roaming chemistry and the formation of  $H_3^+$  from organic molecules in strong laser fields," *Nat. Commun.* 9, 5186 (2018).
229. W. Shang, M. Nairat, P. Pawlaczyk, E. Mroczyka, B. Farris, E. Pines, J. Geiger, B. Borhan, and M. Dantus, "Ultrafast Dynamics of a "Super" Photobase," *Angew. Chem. Int. Ed. Engl.* 57, 14742–14746 (2018).
228. G.A. Murashova, C.A. Mancuso, J.L. Canfield, S. Sakami, K. Palczewski, G. Palczewska, and M. Dantus, "Multimodal nonlinear optical imaging of unstained retinas in the epi-direction with a sub-40 fs Yb-fiber laser," *Biomed. Opt. Express* 11, 5228 (2017).
227. V.V. Lozovoy, M. Nairat, and M. Dantus, "Binary-phase compression of stretched pulses," *J. Opt.* 19, 105506 (2017).
226. M. Dantus, "Femtosecond Laser Shaping: From Laboratory to Industry," CRC Press 2017.

## Appendix A – Full Publications List, M. Dantus

225. N. Ekanayake, M. Nairat, B. Kaderiya, P. Feizollah, B. Jochim, T. Severt, B. Berry, K. Raju P., K.D. Carnes, S. Pathak, D. Rolles, A. Rudenko, I. Ben-Itzhak, C.A. Mancuso, B.S. Fales, J.E. Jackson, B.G. Levine, and M. Dantus, “Mechanisms and time-resolved dynamics for trihydrogen cation ( $H_3^+$ ) formation from organic molecules in strong laser fields,” *Sci. Rep.* 7, 4703 (2017).
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1. *Size-Dependent Femtosecond Proton Transfer in Protonated Methanol Clusters*, S. Anishchik, N. Katturi, J. Sandhu, M. Dantus, *Phys. Chem. Chem. Phys.* **28**, 6711(2026).

<https://doi.org/10.1039/D5CP04925C>

This work addresses a long-standing mechanistic inference based on steady-state mass spectra into a direct dynamical measurement. It resolves the femtosecond onset of proton transfer, charge-driven reorganization, and stabilization in methanol clusters after strong-field ionization. By demonstrating clear size dependence in the formation of  $H^+(CH_3OH)_n$  and  $CHO^+$ , it identifies how expanding hydrogen-bond networks accelerate ultrafast chemical response as the system evolves from isolated molecules toward the condensed phase. In doing so, it establishes methanol clusters as a quantitatively informative benchmark, complementary to water, for testing fundamental models of ionization-induced proton motion and structural rearrangement in hydrogen-bonded liquids.

2. *Factors governing  $H_3^+$  formation from methyl halogens and pseudohalogens* J. Stamm, S. S. Priyadarsini, S. Sandhu, A. Chakraborty, J. Shen, S. Kwon, J. Sandhu, C. Wicka, A. Mehmood, B. G. Levine, P. Piecuch, M. Dantus, *Nat. Commun.* **16**, 410 (2025).

<https://doi.org/10.1038/s41467-024-55065-5>

Building on the elucidation of  $H_2$  roaming by Dantus and co-workers in *Sci. Rep.* **7**, 4703 (2017), this study takes a substantial step forward by explaining the conditions under which that roaming-driven pathway does, or does not, culminate in  $H_3^+$  formation after strong-field double ionization of  $CH_3X$  molecules. The combination of femtosecond measurements, double-ionization-potential EOM-CC calculations, and ab initio molecular dynamics moves the field beyond phenomenology to a predictive mechanistic picture, showing that  $H_3^+$  production depends on both the excess relaxation energy released upon double ionization and the degree of geometric distortion that predisposes the dication toward  $H_2$  formation before proton abstraction. By defining the energetic and structural factors that control this process across a chemically varied series, the work provides a general framework for assessing unimolecular  $H_3^+$  formation and its possible contribution in chemically complex astrophysical environments.

3. *Ultrafast studies of elusive chemical reactions in the gas phase*, M. Dantus, *Science* **385**, eadk1833 (2024). <https://doi.org/10.1126/science.adk1833>

By reframing reactive collisions and electron-initiated chemistry as problems that can now be interrogated on the timescale of atomic motion, this paper marks an important conceptual expansion of femtochemistry beyond its traditional focus on intramolecular processes. It highlights how recent experimental strategies, particularly the use of photoassociation or weakly bound dimers and strong-field electron recollision, are beginning to provide the time zero, structural control, and mechanistic resolution needed to study bimolecular and collision-driven reactions that have long resisted direct observation. In doing so, it identifies a frontier where ultrafast spectroscopy, coincidence detection, and ab initio dynamics can jointly transform our understanding of nonergodic and nonthermal chemistry in atmospheres, combustion, plasma environments, mass spectrometry, astrochemistry, and radiation damage.

4. *Tracking Molecular Fragmentation in Electron-Ionization Mass Spectrometry with Ultrafast Time Resolution*, M. Dantus, *Acc. Chem. Res.* **57**, 033003 (2024). <https://doi.org/10.1021/acs.accounts.3c00713>

By establishing the time of electron impact with femtosecond resolution through strong-field electron recollision, a process recognized by the 2023 Nobel Prize in Physics, this paper overcomes a major barrier to time-resolved electron-ionization mass spectrometry. Its introduction of strong-field disruptive probing makes it possible to track the formation of all fragment ions simultaneously and relate mass-spectral fingerprints to the ultrafast dynamics that produce them. In doing so, it shows that fragmentation often involves nonergodic pathways on femtosecond to picosecond

timescales, with important consequences for fragmentation theory, compound identification, and the broader understanding of electron-initiated chemistry.

5. *H<sub>2</sub> roaming chemistry and the formation of H<sub>3</sub><sup>+</sup> from organic molecules in strong laser fields*, N. Ekanayake, M. Nairat, B. Kaderiya, P. Feizollah, B. Jochim, T. Severt, B. Berry, K. R. Pandiri, K. D. Carnes, S. Pathak, D. Rolles, A. Rudenko, I. Ben-Itzhak, C. A. Mancuso, B. S. Fales, J. E. Jackson, B. G. Levine, M. Dantus, *Nature Communications* **9**, 5186 (2018). <https://doi.org/10.1038/s41467-018-07577-0>  
H<sub>3</sub><sup>+</sup> is considered one of the most important molecules in the universe. It is responsible for the cooling process essential for the formation of stars and for the creation of most water and organic molecules in the universe. Despite this importance, little is known about the dynamics of chemical processes involving H<sub>3</sub><sup>+</sup>, because there is no trigger to time bimolecular processes involved with femtosecond time resolution. This study uses a femtosecond laser pulse to initiate the production of tri-hydrogen cations from hydrocarbons. The formation takes place through a roaming chemical mechanism involving neutral hydrogen molecules. This finding is important in the context of roaming chemical reactions, given that it is the first time-resolved measurement of a roaming reaction and because the roaming partner is a hydrogen molecule.
6. *Ultrafast Dynamics of a “Super” Photobase*, W. Sheng, M. Nairat, P. D. Pawlaczyk, E. Mroczka, B. Farris, E. Pines, J. H. Geiger, B. Borhan, M. Dantus, *Angewandte Chemie International Edition* **57**, 14742 (2018). <https://doi.org/10.1002/anie.201806787>  
Chemical reactions requiring acidic or basic reagents are mixed and allowed to react. When these reactions require very strong acids or bases, the subsequent neutralization can be environmentally costly. Spatially and temporally addressable chemical reagents in the form of super photoacids or super photobases would revolutionize a number of industrial chemical processes. In this work, the energy of light is used to increase the free energy of a compound and altering its equilibrium constant. Here, a fluorene inspired Schiff base (**FR0-SB**) with a ground state pK<sub>a</sub> of 7 is found to have an excited state pK<sub>a</sub><sup>\*</sup> of 21. Having such a high pK<sub>a</sub><sup>\*</sup> allows **FR0-SB** to abstract protons from alcohols in a picosecond timescale. The discovery of a “super photobase” indicates that our strategy to create super photoreagents is valid and may have a significant impact in a number of chemical processes.
7. *Investigating the role of human serum albumin protein pocket on the excited state dynamics of indocyanine green using shaped femtosecond laser pulses*, M. Nairat, A. Konar, M. Kaniecki, V. V. Lozovoy, M. Dantus, *Physical Chemistry Chemical Physics* **17**, 5872 (2015). <https://doi.org/10.1039/c4cp04984e>  
Indocyanine green (ICG) is an important compound approved by the Food and Drug Administration for diagnosis and photodynamic therapy (PDT). In many cases, ICG is injected into the patient, and its long wavelength fluorescence is used to find tumors. Laser excitation leads to the creation of reactive oxidation species (ROS), which cause cell death. This publication uncovers how human serum albumin binds the photodynamic therapy agent and prevents the internal conversion that produces the therapeutic triplet state. This is significant because human serum albumin is ubiquitous in humans. These findings imply the phototherapy agent needs to be modified to enhance its therapeutic configuration, especially when injected.
8. *Highly selective standoff detection and imaging of trace chemicals in a complex background using single-beam coherent anti-Stokes Raman scattering*, M. T. Bremer, P. J. Wrzesinski, N. Butcher, V. V. Lozovoy, M. Dantus, *Applied Physics Letters* **99**, 101109 (2011). <https://doi.org/10.1063/1.3636436>  
By demonstrating broadband femtosecond CARS detection of trace explosive simulants at standoff distance with sensitivities orders of magnitude beyond prior coherent spectroscopic methods, this work moves remote chemical sensing much closer to operational relevance. The combination of high-resolution fingerprint-region spectroscopy and selective imaging shows that hazardous

materials can be identified non-destructively, at low surface loadings, and with strong molecular specificity rather than coarse anomaly detection alone. These advances have made the approach compelling enough that efforts are now underway to translate the underlying concepts into systems intended for installation in public spaces, where rapid and selective screening could provide clear security benefits.

9. *Use of coherent control methods through scattering biological tissue to achieve functional imaging*, J. M. D. Cruz, I. Pastirk, M. Comstock, V. V. Lozovoy, M. Dantus, *Proceedings of the National Academy of Sciences* **101**, 16996 (2004). <https://doi.org/10.1073/pnas.0407733101>

By showing that phase-shaped femtosecond pulses can still drive selective two-photon excitation after propagation through scattering tissue, this work establishes that coherent control can survive conditions far closer to real biological environments than idealized optical systems. The ability to distinguish acidic and basic forms of a pH-sensitive chromophore hidden behind tissue demonstrates not only preservation of control but chemically specific readout through a strongly scattering medium. That result opened an important path toward applying coherent control concepts to biomedical imaging and photodynamic therapy, where selectivity must be maintained in complex tissue rather than in transparent samples.

10. *Multiphoton intrapulse interference. II. Control of two- and three-photon laser induced fluorescence with shaped pulses*, V. V. Lozovoy, I. Pastirk, K. A. Walowicz, M. Dantus, *J. Chem. Phys.* **118**, 3187 (2003). <https://doi.org/10.1063/1.1531620>

By demonstrating orders-of-magnitude control over two- and three-photon excitation for large organic molecules in the condensed phase, this work showed that coherent control could operate under realistic conditions where solvent interactions and spectral congestion might have been expected to wash out selectivity. The combination of experiment and theory was particularly important because it established that the effect does not arise from simple changes in peak intensity, but from deliberate phase shaping of the ultrafast pulse and the resulting multiphoton intrapulse interference. In doing so, it provided a firm physical basis for applying pulse shaping to selective nonlinear spectroscopy and photochemistry in complex molecular environments.

**Intellectual Property Portfolio as of December. 9, 2025****Issued Patents**

	<b>PAT. NO.</b>	<b>Title</b>
37	12392028	Laser Activated Luminescence System
36	12332116	Laser system with self-referencing shaper
35	12308765	Ionic liquid-based piezoelectric apparatus and related methods
34	12019011	Laser system for blood or tissue assessment
33	11502473	Laser apparatus including an optic dispersion compensator
32	11385098	Method and system for characterizing power in a high-power laser
31	11274982	Materials and apparatus with multiple impact level and torque detection
30	10,971,881	Laser pulse including a flat top
29	10,656,062	Materials with detectable compression memory
28	10,598,682	Laser system for measuring fluid dynamics
27	10,444,100	Materials and apparatus with multiple impact level and torque detection
26	10,267,739	Laser system for standoff detection
25	10,130,511	Adaptive laser system for ophthalmic surgery
24	9,202,678	Ultrafast laser system for biological mass spectrometry
23	9,048,632	Ultrafast laser apparatus (for LIBS DOE)
22	9,018,562	Laser material processing system
21	8,861,075	Laser amplification system
20	8,675,699	Laser pulse synthesis system
19	8,633,437	Ultra-fast laser system
18	8,630,322	Laser system for output manipulation
17	8,618,470	Laser based identification of molecular characteristics
16	8,311,069	Direct ultrashort laser system
15	8,300,669	Control system and apparatus for use with ultra-fast laser
14	8,265,110	Laser and environmental monitoring method
13	8,208,505	Laser system employing harmonic generation
12	8,208,504	Laser pulse shaping system
11	8,185,209	Methods to extend vision to infrared wavelengths
10	7,973,936	Control system and apparatus for use with ultra-fast laser
9	7,609,731	Laser system using ultra-short laser pulses
8	7,583,710	Laser and environmental monitoring system
7	7,567,596	Control system and apparatus for use with ultra-fast laser
6	7,450,618	Laser system using ultrashort laser pulses
5	7,439,497	Control system and apparatus for use with laser excitation and ionization
4	7,105,811	Control system and apparatus for use with laser excitation of ionization
3	6,119,567	Method and apparatus for producing a shaped article
2	EP1,723,704	Laser system using ultra-short laser pulses (Europe)
1	JP60048	Laser system using ultra-short laser pulses (Japan)

**Published Pending US Patent Applications**

	<b>PUB. APP. NO.</b>	<b>Title</b>
1	20250369744	MICROSCOPE INCLUDING INTERFEROMETER

## Appendix C – Full Patent Portfolio, M. Dantus

### **MSU Invention Disclosures/Provisional Patent Applications**

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	<b>MSUT No.</b>	<b>Title</b>
1	TEC2026-0178	Single shot measurement
2	TEC2025-0186	Infrared and near infra-red-light exposure to improve muscle function during pregnancy, parturition and postpartum
3	TEC2025-0076	Identifying high-frequency features in a broad background (provisional applied)
4	TEC2024-0084	Bichromatic pulse compression (provisional applied)
5	TEC2023-0095	Piezo-pneumatic device (provisional applied)
6	TEC2023-0094	Pressure-Sensitive Charge-Producing device (provisional applied)
7	TEC2022-0135	3D Nanoscope (provisional applied)

Appendix D – Full Research Funding History, M. Dantus

**Full Research Funding History**

*Listed in reverse chronological order; PI unless otherwise noted.*

<b>Start</b>	<b>End</b>	<b>Source</b>	<b>Title</b>	<b>Amount</b>
10/1/26	9/1/30	National Science Foundation	Research Infrastructure: Mid-scale RI-1 (M1:DA): Ultrafast Electron Microscopy Platforms for Mesoscale Science and Technology (pending)	\$13,809,129
7/1/25	6/1/28	Air Force Office of Scientific Research	Femtosecond Time- and Energy Resolved Electron Ionization Mass Spectrometry	\$484,322
5/1/25	2/1/28	Department of Energy	Dynamics and Control of Strong-Field Dissociative Ionization in Polyatomic Molecules	\$600,000
8/1/24	7/1/27	Department of Energy	Ultrafast time-resolved bimolecular reactions of neutral and ionic species	\$576,130
7/1/22	6/30/27	W.M. Keck Foundation	Diffraction-Less Optical Imaging - Achieving the Resolution of Electron Microscopy with Light in Living Systems	\$650,000
3/1/25	8/1/25	National Science Foundation	Quantum Photonic Integration and Deployment	\$22,000
9/30/21	7/29/25	Air Force Office of Scientific Research	Femtosecond Time-Resolved Electron Ionization Mass Spectrometry	\$523,971
11/1/22	10/31/24	Teledyne FLIR	FLIR Coherent Raman System for Non-Contact Chemical Detection	\$174,662
9/30/21	9/29/24	Air Force Office of Scientific Research	Femtosecond Time-Resolved Electron Ionization Mass Spectrometry	\$176,617
9/15/09	11/14/23	Department of Energy	SISGR: Understanding and Controlling Strong-Field Laser Interactions with Polyatomic Molecules	\$2,347,039
2/14/22	11/13/22	Great Lakes Crystal Technologies Inc	Next Generation Diamond Materials for High-Resolution Quantum Sensors	\$23,020
8/15/19	7/31/22	National Science Foundation	Effects Of Extracellular Matrix - Myocytes Mechanical Coupling in The Heart During Hypertension	\$20,000
11/3/20	5/7/21	IPG Photonics	Pulse Metrology for Quantitative Determination of An Ultrafast Laser Power Figure of Merit	\$31,207
11/14/19	11/13/20	Defense Advanced Research Projects Agency	Super-Photoreagents as A Gateway to Precision Chemistry	\$159,881
8/15/18	7/31/20	National Science Foundation	QLC: Eager: Quantum Control of Energy Transfer Pathways and Chemical Reactions	\$259,234
8/1/15	7/31/18	National Science Foundation	Multidimensional Spectroscopic Measurements on Single Molecules and Ensembles Taking Advantage of Broadband Shaped Pulses	\$420,000
8/1/16	7/31/17	National Science Foundation	Workshop On Chemical Sciences Needs for Mid-Scale Instrument Development	\$67,924
2/5/15	8/4/16	Department of Homeland Security	Single Ultrafast Pulse Excitation for Remote Stimulated Raman Scattering (Super-Srs)	\$275,000
9/15/14	9/14/15	Air Force Office of Scientific Research	Direct Optical Measurement of Vorticity in Fluid Flow	\$66,898
8/28/14	8/27/15	Air Force Office of Scientific Research	Development of Femtosecond for High Rep-Rate Fluid Flow Imaging	\$86,385
8/16/14	8/15/15	Michigan Initiative for Innovation and Entrepreneurship	Towards Practical Standoff Detection of Trace Quantities of Explosives	\$39,204
7/25/14	7/31/15	Department of Defense	Binary Phase Amplification for Ultrafast Lasers	\$40,000

Appendix D – Full Research Funding History, M. Dantus

1/15/13	1/14/14	Air Force Office of Scientific Research	Nonlinear Optical Imaging of Fluid Flow	\$60,400
8/1/09	7/31/12	National Science Foundation	Development Of a Phase and Polarization Modulated Ultrafast Laser Source for Nonlinear Optical Imaging and Molecular Identification	\$749,369
7/15/10	6/30/12	National Science Foundation	Development Of a Novel Laser Source for Nonlinear Optical Applications Early-Concept Grant for Exploratory Research	\$272,000
6/15/10	6/14/12	Air Force Office of Scientific Research	Pulse Shaping Based Ultra-Broad Bandwidth Multidimensional Spectroscopic Methods	\$487,844
4/1/10	3/31/12	Natl Inst Of Health - NIH/PHS	Improving Multiphoton Imaging with Shaped Ultrashort Laser Pulses	\$397,376
2/23/09	3/31/11	Spectral Energies, LLC	Spatially And Temporally Resolved Temperature and Species Concentration Measurements in High-Pressure Combustors Using F	\$150,000
12/1/10	12/31/10	St Mary's Hospital Grand Rapids	Pathology Sectioning with Ultrafast Laser	\$10,000
2/9/10	9/30/10	Johns Hopkins University/DHS	Single Beam Coherent Anti-Stokes Raman Scattering (Cars)	\$408,335
6/29/09	1/25/10	Polaronyx Inc.	Energy Scaling of Ultrashort Pulse (USP) High Energy Fiber Lasers Through Temporal Control	\$21,000
12/21/06	12/31/09	Michigan Economic Development Corp	Application Of Laser-Based Molecular Scalpel Technology for Proteomic and Metabolomic Analysis	\$700,933
8/15/07	7/31/09	National Science Foundation	Controlled Fragmentation and Ionization of Biological Samples	\$150,072
9/15/08	1/31/09	Innovative Scientific Solutions, Inc.	Single Beam Cars Project	\$11,900
8/1/05	7/31/08	National Science Foundation	A Systematic Approach Towards Robust and Efficient Coherent Control Based on Multiphoton Intrapulse Interference	\$172,500
12/15/06	3/31/08	Temple University	Development Of Super-Cars for Remote Detection of CBWA and Explosives	\$148,986
1/1/04	12/31/07	Department of Energy	Coherent Control of Multiphoton Transitions in The Gas and Condensed Phases with Ultrashort Shaped Pulses	\$590,000
10/5/05	10/4/07	Biophotonic Solutions Inc	Binary Phase Shaping for Fast Accurate and Reproducible Molecular Control and CB Detection	\$225,969
8/1/04	7/31/07	National Science Foundation	Development Of Ultrashort Phase-Shaped Femtosecond Laser Technology for Ultrafast Probing of Molecular Switches; Novel M	\$204,009
1/25/07	4/18/07	Mich Molecular Institute	Femtosecond Pulsed Laser Analytical Testing	\$10,000
6/1/05	12/31/06	Mich Univ Commercialization Initiative	Commercialization of MIIPS Box Technology	\$38,000
4/1/02	3/31/05	National Science Foundation	Ultrafast Dynamics and Reactivity in Ground and Excited States; Beyond the Pump Probe Method	\$378,742
8/16/04	2/15/05	Biophotonic Solutions Inc	Binary Phase Shaping for Fast Accurate and Reproducible Molecular Control and CB Detection	\$30,348
4/1/01	12/31/03	Department of Energy	Coherent Control of Molecules with Four Wave Mixing	\$350,000
10/1/95	12/15/01	David & Lucile Packard Foundation	Femtosecond Time-Resolved Measurements of Chemical & Biochemical Molecular Motion	\$600,000
11/15/98	10/31/01	National Science Foundation	Transition State Dynamics of Unconstrained Bimolecular Reactions	\$352,000

Appendix D – Full Research Funding History, M. Dantus

8/1/00	12/31/00	Air Force Office of Scientific Research	Femtochemistry: 1999 Nobel Prize Symposium	\$9,240
9/16/98	9/15/00	Alfred P. Sloan Foundation	Alfred P Sloan Research Fellowship	\$35,000
7/1/98	6/30/99	Dreyfus Camille & Henry Found	Camille Dreyfus Teacher-Scholar Award	\$60,000
7/1/95	6/30/96	Arnold And Mabel Beckman Foundation	Time-Resolved Femtosecond to Microsecond Measurements of Molecular Motion	\$200,000
7/1/93	6/30/94	Dreyfus Camille & Henry Found	Camille & Henry Dreyfus New Faculty	\$25,000

### Invited Talks and Keynotes (2000–2025)

- 2025 – Invited Speaker, Viaje Cuántico, public lecture broadcasted by the Universidad Autonoma de México.
- 2025 – Invited Speaker, Department of Physics and Astronomy, Michigan State University, EastLansing, MI.
- 2025 – Invited Speaker, FRISNO Conference, Aussois, France.
- 2024 – Invited Talk, Ultrafast Phenomena 2024, Barcelona, Spain.
- 2024 – Invited Speaker, Department of Photon Science, Stanford University, Menlo Park CA.
- 2024 – Invited Talk, Gaseous Electronics Conference, San Diego, CA.
- 2024 – Invited Talk, Photodynamics 2024, Santiago Chile.
- 2024 – Invited Talk, Ultrafast Nonlinear Optics and Optical Spectroscopy, IISER Mohali, India (via Zoom).
- 2023 – Invited Speaker, FRISNO Conference, Weizmann Institute and Ein-Gedi, Israel.
- 2023 – Invited Speaker, Department of Chemistry, Tel Aviv University, Tel Aviv, Israel.
- 2023 – Invited Speaker, Department of Chemistry, Colorado State University, Fort Collins, CO.
- 2023 – Invited Speaker, Department of Chemistry, University of Colorado Boulder, Boulder, CO.
- 2023 – Presentation as recipient of the Ahmed H. Zewail Award in Ultrafast Science and Technology.
- 2023 – Invited Speaker, Department of Chemistry, University of California San Diego, San Diego, CA.
- 2023 – Invited Speaker, Department of Physics, University of Konstanz, Konstanz, Switzerland.
- 2023 – Invited talk, Femtochemistry 15 Conference, Berlin, Germany.
- 2023 – Invited talk, XVII Iberian Joint Meeting on Atomic and Molecular Physics (IBER2023) Conference, Coimbra, Portugal.
- 2022 – Invited Talk, SLAC, Stanford University, Stanford CA.
- 2022 – Invited Speaker, Gordon Conference, Molecular Dynamics.
- 2022 – Invited Speaker, MOLEC 2022, Hamburg, Germany.
- 2021 – Invited talk Center for Free-Electron Laser Science – Deutsches Elektronen-Synchrotron DESY.
- 2021 – Invited Talk Pacificchem, Frontiers in Ultrafast Spectroscopy of Photoexcited States (via Zoom).
- 2021 – Invited Talk Pacificchem, Ultrafast Intense Laser Chemistry (via Zoom).
- 2020 – Invited to present at the UCI Irvine 2020 Retinal Imaging Colloquium.
- 2020 – Invited to present a Modern Optics and Spectroscopy Seminar at MIT, Cambridge, MA.
- 2020 – Invited talk NSF NeXUS User Workshop on ‘Killer Applications’.
- 2020 – Invited talk at the ACS Symposium on Addressing Chemical Complexity.
- 2020 – Invited Talk, SLAC PULSE Workshop, Menlo Park, CA.
- 2019 – Invited colloquium speaker, Department of Physics, Georgia State University, Atlanta, GA.
- 2019 – Invited colloquium speaker, University of Arizona Dept. of Chemistry, Tucson, AZ.
- 2019 – Invited talk at the Femtosecond Electron Imaging and Spectroscopy 4 (FEIS-4) conference.
- 2019 – Invited talk at the 29th International Conference on Photochemistry.
- 2019 – Invited talk at Femtochemistry 14 Conference, in Shanghai, China.
- 2019 – Invited talk at the University of Shanghai for Science and Technology, Shanghai, China.
- 2019 – Invited to give the Richard Bernstein Lecture at UCLA, Los Angeles, CA.
- 2018 – Invited speaker, Femtochemistry 13 Conference, Cancún, Mexico.
- 2018 – Invited speaker, Symposium on Standoff Detection of Explosives, Pittcon 2018, [location].
- 2018 – Invited speaker, School of Engineering and Applied Sciences Seminar, Harvard University, Cambridge, MA.
- 2018 – Invited talk Nobel Laureate Ahmed Zewail’s Memorial Meeting. “Femtochemistry of extreme chemical reactions in gas and condensed phase.” Caltech, Pasadena CA.
- 2018 – Invited talk ACS Meeting, Strong Field Science: Boston, MA.
- 2018 – Plenary speaker: LXI National Physics Congress, Division of Atomic and Molecular Physics, Puebla, Mexico.
- 2018 – Invited speaker: Center for Ultrafast Optical Sciences, Noon Seminar, University of Michigan, Ann Arbor, MI.
- 2017 – Invited speaker, Pittcon 2017 Symposium on Standoff Detection of Explosives, Pittsburg, PA.
- 2017 – Invited speaker, Coblenz Society Spectroscopy Award Symposium (Biomedical Imaging), Pittcon 2017, Pittsburg, PA.
- 2017 – Invited speaker, Zewail Award Symposium, ACS National Meeting, San Francisco, CA.
- 2017 – Invited speaker, Novel Techniques in Microscopy Conference, San Diego, CA.
- 2017 – Invited speaker, Department of Chemistry Seminar, University of Pennsylvania, Philadelphia, PA.

## Appendix E - Invited Talks and Keynotes (2000–2025), Marcos Dantus

- 2017 – Invited speaker, CLEO Symposium on Medical Devices and Systems (multimodal biomedical imaging), San Jose, CA.
- 2017 – Plenary talk at the at the Universidad Autonoma Metropolitana Ixtapalapa in Mexico.
- 2017 – Invited talk at the OPUMA(Optics, Photonics and Upcoming Methods and Applications) at the Universidad Autonoma de Mexico.
- 2017 – Plenary talk at the Ultrafast Optics School 2017 at the Universidad Autonoma de Mexico.
- 2016 – Invited speaker, MSU Foundation Investiture Lecture, Michigan State University, East Lansing, MI.
- 2016 – Invited speaker, Joint Lecture to Ophthalmology, Pharmacology, and Biomedical Engineering, Case Western Reserve University, Cleveland, OH.
- 2016 – Invited short-course instructor, Nonlinear Optical Spectroscopy Course, Trace Explosives Detection Conference, Charlottesville, VA.
- 2016 – Invited speaker, DAMOP 2016 Conference, Providence, RI.
- 2016 – Invited speaker, CLEO 2016, Multisoliton Compression Session, San Jose, CA.
- 2016 – Invited lecture, ICFO – The Institute of Photonic Sciences, Barcelona, Spain.
- 2016 – Invited speaker, Traumatic Brain Injury Summit, Philadelphia, PA.
- 2016 – Invited speaker, MSU Foundation Professor Investiture Talk, Michigan State University, East Lansing, MI.
- 2015 – Invited speaker, Physics of Quantum Electronics (PQE) Conference, Snowbird, UT.
- 2015 – Invited speaker, Chemistry Colloquium, Ohio State University, Columbus, OH.
- 2015 – Invited speaker, Physics Colloquium, University of California, Irvine, Irvine, CA.
- 2015 – Invited speaker, Trace Explosives Detection Conference, Pittsburgh, PA.
- 2015 – Invited speaker, FEIS-2: Femtosecond Electron Imaging and Spectroscopy Conference, East Lansing, MI.
- 2015 – Invited speaker, Laser and Applied Photonics Seminar, Michigan State University, East Lansing, MI.
- 2015 – Invited speaker, APS Division of Atomic, Molecular, and Optical Physics (DAMOP) Meeting, Columbus, OH.
- 2015 – Invited speaker, Spectroscopic Imaging Workshop, Purdue University, West Lafayette, IN.
- 2015 – Invited speaker, Advanced Solid State Lasers Conference and Exhibition (ASSL), Berlin, Germany.
- 2015 – Invited speaker, Joint Laser Seminar, Institute of Quantum Electronics and Laboratory of Physical Chemistry, ETH Zürich, Zürich, Switzerland.
- 2014 – Invited speaker, Symposium on Nonlinear Optical Spectroscopy, Pittcon, Chicago, IL.
- 2014 – Invited speaker, Department of Chemistry Seminar, Northwestern University, Evanston, IL.
- 2014 – Invited speaker, Symposium on Ultrafast Laser Applications in Mass Spectrometry, Pittcon, Chicago, IL.
- 2014 – Invited speaker, Department of Chemistry Seminar, Wayne State University, Detroit, MI.
- 2014 – Invited speaker, International Mining Expo (IMEX), on reducing fuel consumption and emissions in mining operations, Las Vegas, NV.
- 2014 – Invited speaker, Chautauqua Program, Purdue University, West Lafayette, IN.
- 2014 – Invited speaker, Gordon Conference on Medical Lasers, New Hampshire, NH.
- 2014 – Invited speaker, LAMMP Seminar, Beckman Laser Institute and Medical Clinic, University of California, Irvine, Irvine, CA.
- 2014 – Invited speaker, SciX Conference, Reno, NV.
- 2014 – Invited speaker, Frontiers in Optics, Tucson, AZ.
- 2014 – Invited speaker, Dow Chemical Company, Midland, MI.
- 2014 – Invited speaker, Physical Chemistry Seminar, Ohio State University, Columbus, OH.
- 2014 – Invited speaker, Physics Colloquium, Ohio State University, Columbus, OH.
- 2014 – Invited speaker, Physical Chemistry Seminar, University of California, Davis, Davis, CA.
- 2014 – Invited speaker, Colloquium, Center for Ultrafast Optical Science, University of Michigan, Ann Arbor, MI.
- 2014 – Invited speaker, LCLS-II Workshop, SLAC National Accelerator Laboratory, Menlo Park, CA.
- 2013 – Invited colloquium speaker, Arizona College of Optical Sciences, Tucson AZ.
- 2013 – Invited colloquium speaker, Department of Physics, Kansas State University, Manhattan, KS.
- 2013 – Invited colloquium speaker, Department of Chemistry, University of Chicago, Chicago, IL.
- 2013 – Invited speaker, 11th Femtochemistry Conference, Copenhagen, Denmark.
- 2013 – Invited speaker, Telluride Conference on Frontiers in Biomedical Imaging, Telluride, CO.
- 2013 – Invited speaker, SciX Conference session on Standoff Detection of Explosives, Milwaukee, WI.
- 2013 – Invited speaker, ITAMP–Kansas meeting on Molecules Under Intense Laser Fields, Lawrence, KS.
- 2013 – Invited speaker, Modern Optics and Spectroscopy Series, Massachusetts Institute of Technology, Cambridge, MA.

## Appendix E - Invited Talks and Keynotes (2000–2025), Marcos Dantus

- 2013 – Invited speaker, Department of Chemistry Colloquium, Boston University, Boston, MA.
- 2013 – Invited speaker, OSA Incubator Meeting on Multiphoton Optogenetics (NSF–OSA), [location].
- 2012 – Invited panelist, Michigan Policy Conference, Mackinac Island, MI (speaking on Biophotonic Solutions and export-driven photonics).
- 2012 – Chair and moderator, Market Focus Panel on Ophthalmic Applications of Femtosecond Lasers, CLEO.
- 2012 – Invited presentation, DARPA Workshop Program in Ultrafast Laser Science and Engineering (PULSE).
- 2012 – Invited talk, GE Global Research Center, Niskayuna, NY.
- 2012 – Invited speaker, Coherent Control Conference, Neve Ilan, Israel.
- 2012 – Invited talk, Waterloo Chemical Physics Conference, Waterloo, Ontario, Canada.
- 2011 – Leader, invited discussion on “Biophotonics Technology Transfer,” CLEO.
- 2011 – Invited Talk, Physics and Quantum Electronics (PQE) Conference, Snowbird, UT.
- 2011 – Invited Talk, Novel Methods in Microscopy Conference, Monterrey CA.
- 2011 – Invited Lecture at the department of Electrical Engineering, University of Colorado Boulder, CO.
- 2011 – Invited Lecture at Joint Institute for Laboratory Astrophysics (JILA), University of Colorado Boulder, CO.
- 2011 – Invited Talk, European Conference on Nonlinear Optical Spectroscopy, Twente University, Twente, Netherlands.
- 2011 – Invited to give a Quantum Science Colloquium at the Imperial College, London, England.
- 2010 – Invited speaker, Physics and Quantum Electronics (PQE) Conference, Snowbird, UT.
- 2010 – Invited speaker, Ringberg Coherent Control Conference, Ringberg, Germany.
- 2010 – Invited Speaker, European Conference on Nonlinear Optical Spectroscopy, Bremen, Germany.
- 2010 – Invited Speaker, Canadian Chemical Society, Ottawa, CA.
- 2010 – Invited Talk, Department of Chemistry, Weizmann Institute, Rehovot, Israel.
- 2010 – Invited Speaker, International Conference on Raman Spectroscopy, Boston MA.
- 2010 – Invited Talk, Federation of Analytical Chemistry and Spectroscopy Societies, Raleigh NC.
- 2009 – Invited speaker, Small Chemical Businesses and Nanoscience Symposium, ACS National Meeting.
- 2009 – Invited speaker, Femtochemistry 9 Conference, Beijing, China.
- 2005 – Invited Speaker, Michigan Universities Commercialization Initiative, Ann Arbor, MI.
- 2004 – Invited Speaker, DARPA Workshop on Arbitrary Waveform Generation, Washington, DC.
- 2004 – Han-Mo Koo Memorial Seminar Lecture, Van Andel Institute, Grand Rapids, MI.
- 2003 – Phi Beta Kappa Keynote Address, “Teaching after the information revolution,” Michigan State University.
- 2001 – Plenary lecture, 8th International Workshop on Femtosecond Technology (FST 2001), Tsukuba, Japan.
- 2000 – Keynote speaker, Tau Beta Pi, MSU chapter, Michigan State University.
- 2000 – Invited speaker, Haslett Rotary Club, Haslett, MI.