# TERRENCE R. MEYER, PH.D.

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*Professor of Aeronautics and Astronautics (by Courtesy), Purdue University, West Lafayette, Indiana, USA*

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# ​research focus

* Experimental investigation of thermal-fluid transport phenomena at extreme conditions relevant to power, propulsion, defense, and aero-thermal systems.
* Development and application of novel in-situ laser and x-ray diagnostics for detailed investigation of highly complex multiphase and reacting flowfields found in combustion, sprays, energetics, and high-speed flows under thermal, fluid dynamic, and/or chemical non-equilibrium.

# research Challenges

* Flows in rotating detonation engines, gas-turbines, rockets, internal combustion engines, scramjets, fireballs, and multiphase blasts are extremely complex.
* Such flows are characterized by widely varying levels of turbulence, chemical reactions, temperatures, and pressures within optically complex environments including particulates, droplets, supercritical fluids, and shock-wave interactions.

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# research needs

* Understanding and predicting the performance of next generation devices requires advanced diagnostics, therefore, that can resolve a wide range of spatio-temporal scales, interrogate multiple phases, and extract quantitative information about velocity and state variables (temperature, pressure, and density) within such extreme environments.
* Numerical tools are also needed to extract meaningful information about the dynamics of such systems from large data sets to predict their safe, clean, and efficient operation.

# ACADEMIC TRAINING

###### **Ph.D., Mechanical Engineering, University of Illinois at Urbana-Champaign, 2001**

* Thesis: Turbulent molecular mixing in gaseous free shear flows
* Academic Co-advisors: J. Craig Dutton and Robert P. Lucht
* AIAA Foundation Graduate Award in Fluid Dynamics, 2001
* Ford Foundation Dissertation Fellowship, 2000

###### **M.S., Mechanical Engineering, University of Illinois at Urbana-Champaign, 1997**

* Thesis: The effects of asymmetry and cylinder head deformation on diesel engine exhaust valve temperatures and stresses
* Academic Advisor: Robert A. White
* National Science Foundation Graduate Research Fellowship
* University of Illinois Foundation Graduate Research Fellowship

# B.M.E., Mechanical Engineering, University of Minnesota at Minneapolis-St. Paul, 1993

* University of Minnesota Institute of Technology Foundation Scholarship, 1992-1993
* Frank Louk Scholarship, 1991-1993
* Regents of the University of Minnesota Service Award, 1992
* Oscar, Wiley, Mitchell Scholarship, 1988-1992
* National Science Foundation Undergraduate Research Opportunities Grant, 1991

# PROFESSIONAL Experience

## Professor, School of Mechanical Engineering, Purdue University, 2015-present

## Professor by Courtesy, School of Aeronautics and Astronautics, Purdue University, 2017-present

## Guest Professor, Erlangen Graduate School in Advanced Optical Technologies (SAOT), Friedrich-Alexander University Erlangen-Nürnberg, Germany, 2010-2020

## Associate Professor, Department of Mechanical Engineering, Iowa State University, 2012-2015

* Faculty Coordinator, Clean Energy Technologies Program, 2009-2015

## Assistant Professor, Department of Mechanical Engineering, Iowa State University, 2006-2012

* William and Virginia Binger Assistant Professor of Mechanical Engineering, 2011-2012

## Research Affiliate, Bioeconomy Institute, Iowa State University, Ames, IA, 2006-2018

## Senior Research Engineer, Innovative Scientific Solutions, Inc., Wright-Patterson AFB, OH, 2000-2006

## Visiting Assistant Professor, EM2C, École Centrale Paris, France, 2001-2004

## Graduate Research Assistant, University of Illinois at Urbana-Champaign, 1994-2000

## Mechanical Engineer, Cummins Engine Company, Columbus, Indiana, 1993-1994

# Teaching EXPERIENCE

## School of Mechanical Engineering, Purdue University, 2015-2023

## Spring 2024: ME525 Combustion

## Fall 2023: ME500 Advanced Thermodynamics

## Spring 2023: ME440 Automotive Prime Movers: Green Engines & Clean Fuels

## Fall 2022: ME200 Thermodynamics

## Spring 2022: ME525 Combustion

## Fall 2021: ME500 Advanced Thermodynamics (Outstanding Engineering Teachers)

## Spring 2021: ME440 Automotive Prime Movers: Green Engines & Clean Fuels

## Fall 2020: ME500 Advanced Thermodynamics (Outstanding Engineering Teachers)

## Spring 2020: ME525 Combustion (Outstanding Engineering Teachers)

## Fall 2019: ME500 Advanced Thermodynamics (Outstanding Engineering Teachers)

## Summer–Fall 2019: ME597SE Science and Engineering of Energetic Materials

## Spring 2019: ME440 Automotive Prime Movers: Green Engines and Clean Fuels

## Fall 2018: ME500 Advanced Thermodynamics (Outstanding Engineering Teachers)

## Spring 2018: ME300 Thermodynamics II

## Fall 2017: ME200 Thermodynamics I

## Spring 2017: ME440 Automotive Prime Movers: Green Engines and Clean Fuels

## Fall 2016: ME200 Thermodynamics I (Outstanding Engineering Teachers)

## Spring 2016: ME525 Combustion

## Fall 2015: ME200 Thermodynamics I

## Department of Mechanical Engineering, Iowa State University, 2006-2015

## Undergraduate Courses Taught: Thermodynamics, Fluid Flow, Heat Transfer

## Graduate Courses Taught: Advanced Combustion, Convection Heat Transfer

## Departments of Mechanical Engineering and Theoretical and Applied Mechanics, University of Illinois at Urbana-Champaign, 2000

## Graduate Teaching Certificate

## Fluid Mechanics (co-instructor) and Internal Combustion Engines Laboratory (teaching assistant)

# summary of Publication record and impact

* **Archival works as of Jan. 2025:** 138 journal articles, 179 technical proceedings, 5 book chapters, 1 patent, and 3 invention disclosures.
* **Google citations as of Jan. 2025:** h-index 50, i10-index 140, and over 7100 citations
* **Presentations as of Jan. 2025:** 198 oral presentations, including 45 invited lectures
* **Research Grants by Prime Source (Purdue):** Over 60 externally funded research awards at Purdue University, including DARPA, NASA, DOE, AFRL, AFOSR, ARL, ONR, Space Force, DTRA, NSF, Spectral Energies, LLC, Sandia National Laboratories, and Southwest Research Institute.

# summary of academic advising, Mentoring, and engagement

* **Purdue University, 2015–present** 
  + 1 Post-doctoral research associate (current)
  + 39 PhD students (22 current, 1 incoming, 17 graduated)
  + 17 MS students (8 current, 1 incoming, 8 graduated)
  + 1 Research Associate Professor (current)
  + 3 Research Scientists (2 current)
  + 2 Research Engineers
  + 72 Program of Study thesis advisees
  + 19 Program of Study non-thesis advisees
  + 54 undergraduate research assistants
  + 57 independent study project advisees
  + 12 ME Summer 2020 Project Team Students (4 women, 2 underrepresented minorities)
  + 2 honors project advisees (1 woman)
  + 2 Bottomley Undergraduate Research Fellows (1 woman)
  + 1 Summer Stay researcher (1 woman)
  + 8 SURF students (2 underrepresented minorities)
  + 2 SROP students (2 underrepresented minorities)
* **Iowa State University, 2006–2015**
  + 4 Post-doctoral associates (all currently university professors)
  + 8 PhD students (8 graduated, 2 in academic positions)
  + 14 MS students (14 graduated)
  + 44 Program of Study advisees (44 graduated)
  + 20 honors student researchers (6 women, 1 underrepresented minority)
  + 29 independent study projects (1 woman)
  + 8 NSF REU student researchers (3 women, 1 underrepresented minority)
  + 34 undergraduate research assistants (6 women, 2 underrepresented minorities)
  + 5 high-school student researchers (4 underrepresented minorities)

# leadership and Recognition

* **Colloquium Co-Coordinator** of Diagnostics and Experimental Methods, 41st International Symposium on Combustion (2025-2026).
* **Fellow and Associate Fellow Status:**
  + **Fellow of the Combustion Institute** (2025)
  + **Fellow of Optica**, formerly Optical Society of America, OSA (2022)
  + **Fellow of the American Society of Mechanical Engineers**, ASME (2017)
  + **Associate Fellow of the American Institute of Aeronautics and Astronautics**, AIAA (2006)
* **Awards Chair** (2021-2026), Technical Chair (2018-2019) and Deputy Technical Chair (2017-2018), Chair for Award Nominations (2009-2016), Session Chair at Scitech Conference (2016), Aerodynamic Measurement Technology (AMT) Committee, AIAA Science and Technology Forum and Exposition
* **Colloquium Co-Chair** of Diagnostics Section for 39th and 40th International Symposium on Combustion (2021-2024) and Session Chair of Diagnostics Session (2023-2024).
* **Walter Lempert Best Paper Award,** AIAA SciTech Forum (2023)
* **Aerodynamic Measurement Technology Innovation Award** (2023) from the American Institute of Aeronautics and Astronautics for "advancement and commercialization of pulse-burst laser technology, innovations in high-speed laser diagnostics, and applications in hypersonic ground test facilities."

###### **Chair** (2019-2023), Vice Chair (conference held in Switzerland, 2017-2019), Discussion Leader (CARS Session, 2017), Invited Lectures (2007, 2011), and Hot Topics Invited Talks (2005, 2009, 2015), Gordon Research Conference on Laser Diagnostics in Energy and Combustion Science (formerly Laser Diagnostics in Combustion)

###### **Representative for School of Mechanical Engineering**, Purdue University Senate (2020-2023)

###### **Chair**, Graduate Admissions Fellowship Subcommittee (2017-2023) and Member of Diversity Subcommittee (2018-2019), School of Mechanical Engineering, Purdue University

###### **School of Mechanical Engineering Spira Award**, given for inspiring students and fostering excellence in commercial or defense product realization (2022)

* **Listed among most downloaded articles** in Combustion and Flame in the 90 days since publication (2022, 2021)

###### **Editor's Pick or Cover Feature** for Applied Physics Letters (2022), Optics Letters (2020, 2019), Applied Optics (2019, 2009, 2003), and Applied Spectroscopy (2007)

###### **List of Outstanding Engineering Teachers**, Purdue University (Fall 2021, Fall 2020, Fall 2019, Spring 2018, Fall 2016)

###### **Co-Chair**, International Constant Volume & Detonation Combustion Workshop, Purdue University (2019)

###### **Voted in Top 10, Solberg Award** for Best Teacher in Mechanical Engineering, Purdue University (2019)

* **Session Chair**, ILASS Americas, 29th Annual Conference on Liquid Atomization & Spray Systems (2017)
* **Awardee, NSF CAREER Award**, Combustion, Fire, and Plasma Systems, (2011-2017)
* **Best Student Presentation**, 25th Annual Institute for Liquid Atomization and Spray Systems (ILASS)-Americas Conference (2013)
* **William and Virginia Binger Assistant Prof. of Mechanical Engineering**, Iowa State Univ (2011-2012)
* **Best Paper**, Conference on Lasers and Electro-Optics, Active Optical Sensing (2011)
* **General Co-Chair** (2010-2012) and Program Co-Chair (2008-2010), Optical Society of America’s Conference on Laser Applications to Chemical, Security, and Environmental Analysis
* **Young Researcher Award**, Erlangen Graduate School in Advanced Optical Technologies (2010)
* **Chair** (2009-2010) and Vice-Chair (2008-2009), Optical Society of America’s Conference on Lasers and Electro-Optics, Subcommittee on Active Optical Sensing
* **Co-editor**, Applied Optics, Laser Applications to Chemical, Security, and Environmental Analysis (2011)

###### **Co-Chair**, 2nd Dayton Engineering Sciences Symposium (2006)

###### **Chair**, Ohio Valley Section of the Society for Applied Spectroscopy (2005-2006)

###### **Member**, ASME Dayton Section Technical Committee (2004-2006)

###### **AIAA Dayton-Cincinnati Section Outstanding Technical Contribution Award** (2003)

###### **AIAA Foundation Graduate Award in Fluid Dynamics** (2001)

* **Graduate Fellowships**: Ford Foundation (2000), NSF (1994-1997), University of Illinois (1994-1997)

# Professional Societies

**Active Memberships:** Optica (Fellow, formerly Optical Society of America), American Society of Mechanical Engineers (Fellow), American Institute of Aeronautics and Astronautics (Associate Fellow), Combustion Institute (Member), American Physics Society (Member), Institute for Liquid Atomization and Spray Systems (Member), Pi Tau Sigma (Member), Tau Beta Pi (Member).

# REVIEWS

* **Journal Article Reviews:** AIAA Journal, Applied Optics, Applied Physics B, Applied Physics Letters, ASME International Gas Turbine Institute, ASME Journal of Fluids Engineering, ASME Journal of Nanotechnology in Engineering and Medicine, Atomization and Sprays, Combustion and Flame, Experiments in Fluids, Fuel, International Journal of Multiphase Flow, Journal of Quantitative Spectroscopy and Radiative Transfer, Journal of Raman Spectroscopy, Measurement Science and Technology, Physics of Fluids, Proceedings of the Combustion Institute, Flow Turbulence and Combustion, Optics Express, Optics Letters
* **Conference Paper Reviews:** Optical Society of America (CLEO and LACSEA), SAE World Congress, AIAA Scitech, Combustion Institute (International Symposium on Combustion), American Physical Society Division of Fluid Dynamics
* **Proposal Reviews:** National Science Foundation, Army Research Office, and Department of Energy

# Editorships

* **Associate Editor,** Optics Express, Aug. 1, 2023–present.
* **Co-editor**, special issue of Applied Optics on Laser Applications Chemical, Security, and Environmental Analysis, Feb. 1, 2011.

# Short courses

* Terrence Meyer and Mikhail Slipchenko, “Advanced Laser Techniques (Part 3 of 3): High-Speed Lasers and Applications,” as part of Short Course on “Non-Intrusive Laser-Based Diagnostic Techniques for Hypersonic Flows,” NASA Langley Research Center, Hampton, VA, Sept. 28, 2023.
* Mikhail Slipchenko and Terrence Meyer, “High-Speed Lasers and Applications,” as part of Post-Forum Short Course on “Non-Intrusive Laser-Based Diagnostic Techniques for Hypersonic Flows,” AIAA Defense and Security Forum, Laurel, MD, Apr. 22, 2022.

**Formally invited lectures and conference presentations**

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| 45. | “Measurements and Advanced Diagnostics for Reacting Systems,” as part of invited panel session PC-16/PGC-12/AMT-16 at AIAA Scitech 2025 Forum, Orlando, FL, Jan. 7, 2025. |
| 44. | “Recent Progress and Outstanding Challenges in Two-Phase Detonations,” as part of invited panel session PC-07/PGC-05 at AIAA Scitech 2025 Forum, Orlando, FL, Jan. 6, 2025. |
| 43 | “High Speed Lasers and Applications,” as part of Invited Seminar on “Non-intrusive Laser-based Diagnostic Techniques for Hypersonic Flows,” AIAA Scitech 2025 Forum, Orlando, FL, Jan. 7, 2025. |
| 42. | “Ultrafast and Ultrahigh-speed Laser Diagnostics for Extreme Aero-thermal Environments,” Invited Lecture at Distinguished Lecture Series, Texas A&M University, Oct. 10, 2024. |
| 41. | “Application of CARS for Realistic Combustion Systems,” Invited Talk for the 2024 Multi-Agency Coordinating Committee on Combustion Research (MACCCR) Annual Energy, Fuel and Combustion Research Review, Georgia Tech, Atlanta, GA, Sept. 09–13, 2024. |
| 40. | “Probing Complex Flows with a Burst in Time: Innovations and Maturation of the Burst-Mode Laser,” Invited Lecture for the 2023 Aerodynamic Measurement Technology Innovation Award from the American Institute of Aeronautics and Astronautics, presented by Mikhail Slipchenko on behalf of S. Roy, T. Meyer, J. Mance, N. Jiang. And P. Hsu at the AIAA Scitech Forum and Exposition, National Harbor, MD, Jan. 25, 2023. |
| 39. | “Optical and X-ray Based Multi-Dimensional Characterization of Multiphase Material Dynamics,” Invited Talk at the Materials Science in Extreme Environments - University Research Alliance (MSEE-URA) Virtual Presentation, June 7, 2022. |
| 38. | “Towards 4D Measurements in Complex Multiphase Flows,” Keynote Talk at the ILASS Americas Conference on Liquid Atomization and Spray Systems, Madison, WI, May 22-25, 2022. |
| 37. | “High-Speed Optical Diagnostics for Investigation of Combustion Physics in Rotating Detonation  Engines,” International Conference on Materials and Systems for Sustainability, Nagoya, Japan, Nov. 4, 2021. |
| 36. | “Development of Short-Pulse Laser Diagnostics for High-Speed Flows: Current Applications and Future Prospects,” Invited Talk at Short Pulsed Lasers Discussion Group at AIAA Scitech 2020 Forum, Orlando, FL, Jan. 6–10, 2020. |
| 35. | "Turbine-RDC integration: an Oasis of Aerothermal Challenges," International Constant Volume and Detonation Combustion Workshop, West Lafayette, IN, Aug. 18, 2019. |
| 34. | “Advanced Diagnostics for Propulsion Sprays,” Air Force Research Laboratory, Wright-Patterson AFB, OH, Apr. 5, 2019. |
| 33. | “Advances in Optical Diagnostics for Extreme Aerothermal Flows,” International Conference on Advanced Optical Technologies, University of Erlangen-Nürnberg, March 13–15, 2019 (Keynote). |
| 32. | “High-Fidelity Experimental and Computational Methods for Advancing Next Generation Propulsion Systems,” Air Force Science and Technology 2030, Bloomington, IN, May10-11, 2018. |
| 31. | “Towards 4-D (x-y-z-t) Multi-parameter (T-V-C) Measurements in Aerothermal Flows,” Lund University, Sweden, May 3, 2018. |
| 30. | “Laser-based diagnostics for kHz-MHz Characterization of Energetic Reactions,” Joint Army-Navy-NASA-Air Force (JANNAF) 48th Combustion Subcommittee Meeting, Newport News, VA, Dec. 6, 2017. |
| 29. | “Advances in 4D Imaging of Combustion and Sprays,” SAOT Innovation Day, Friedrich-Alexander University, Erlangen-Nuremberg, Germany, July 13, 2017. |
| 28. | “Advances in Multidimensional and High-speed Imaging of Sprays,” AIAA Aviation and Aeronautics Forum and Exposition, Denver, CO, June 5-9, 2017. |
| 27. | “Real-Time Characterization of Hot Spot Formation,” Purdue Energetic Materials Summit, West Lafayette, IN, May 22-24, 2017. |
| 26. | “Voids, Bubbles, Holes, and Complex Three-Dimensional Spray Structures Revealed by High-Speed X-ray Imaging,” ILASS Americas 29th Annual Conference on Liquid Atomization and Spray Systems, Atlanta, GA, May 15-18, 2017. |
| 25. | “Temperature Measurements at Elevated Pressures and Nonequilibrium Conditions Using fs-ps CARS,” Matter-Radiation Interactions in Extremes (MaRIE) Thermometry Workshop, Santa Fe, NM, Sept. 28-29, 2016. |
| 24. | “High-Speed Three-Dimensional Tomography of Soot and Combustion Intermediates in Jet Diffusion Flames,” Laser Applications to Chemical, Security, and Environmental Analysis, Heidelberg, Germany, July 25-28, 2016. |
| 23. | “Investigation of Thermal-Fluid Behavior under Extreme Environments Relevant to Advanced Propulsion Systems,” Sandia National Laboratories, Albuquerque, NM, Mar. 17, 2016. |
| 22. | “Burst-Mode Diagnostics for Combustion Species: Evolution to 4D Imaging and Nonlinear Spectroscopy,” 54th AIAA Aerospace Sciences Meeting, San Diego, CA, Jan. 6, 2016. |
| 21. | “Hybrid Fs/Ps Coherent Anti-Stokes Scattering in Nonequilibrium Environments,” Gordon Research Conference, Waterville Valley, NH, Aug. 9-14, 2015. |
| 20. | “Optical Diagnostics for Sprays and Combustion,” NASA Johnson Space Center Invited Seminar, Houston, TX, Aug. 11, 2014. |
| 19. | “Multi-dimensional High-Speed Imaging for Turbulence and Combustion,” SAOT Innovation Day, Friedrich-Alexander University, Erlangen-Nuremberg, Germany, July 9, 2014. |
| 18. | "Investigation of Multiphase Flow Physics Using Synchrotron-Based X-Ray Radiography and Fluorescence," Optical Society of America's Imaging and Applied Optics Congress, Laser Applications to Chemical, Security and Environmental Analysis, Seattle, WA, July 14-16, 2014. |
| 17. | "KHz-rate Interference-free Thermometry at High Pressure Using fs/ps CARS," Conference on Augmentor Design Systems, Jacksonville, FL, March 21-23, 2012. |
| 16. | "Resolving Dense Sprays using Structured Light Imaging and X-Ray Radiography," Conference on Augmentor Design Systems, Jacksonville, FL, March 21-23, 2012. |
| 15. | “Latest Developments on Hybrid fs/ps CARS for Combustion Sensing,” Conference on Laser Applications to Chemical, Security, and Environmental Analysis, San Diego, CA, Jan. 30, 2012. |
| 14. | “Exploiting the Time and Frequency Domain for Combustion Measurements Using Hybrid ps/fs CARS,” Gordon Research Conference on Laser Diagnostics in Combustion, Waterville Valley, NH, Aug. 14–19, 2011. |
| 13. | “Wavelength Agile Laser Sources for High-Speed Imaging and Spectroscopy in Combusting Flows,” 49th AIAA Aerospace Sciences Meeting and Exhibit, Orlando, FL, Jan. 5, 2011. |
| 12. | “Ammonia Combustion with Near-Zero Pollutant Emissions,” Iowa Energy Center 20th Anniversary Celebration, Ames, IA, Nov. 5, 2010. |
| 11. | “2D Drop Sizing and Vapour Distribution by Using Fluorescence, Phosphorescence, and Mie Scattering,” 10th Int’l SAOT Workshop, Spray Diagnostics, Erlangen, Germany, Oct. 12–13, 2010. |
| 10. | “Continuing Developments in High-Speed Imaging and Velocimetry,” AIAA Paper 2010–4354, 27th AIAA Aerodynamic Measurement and Ground Testing Conference, Chicago, IL, June 28, 2010. |
| 9. | “A High-Speed PLIF/PIV Instrument for Investigating Unsteady Combustion,” Conference on Augmentor Design Systems, Jacksonville, FL, Mar. 17–19, 2010. |
| 8. | “Recent Progress in High-Speed Laser Spectroscopy for Combustion,” Friedrich-Alexander University, Erlangen-Nuremberg, Germany, Dec. 16, 2009. |
| 7. | “Hybrid fs/ps CARS Spectroscopy in Flames,” Gordon Research Conference on Laser Diagnostics in Combustion, Waterville Valley, NH, Aug. 16–20, 2009 (Hot Topics session). |
| 6. | “In-Situ Diagnostics for Characterizing Biofuel Combustion and Emissions,” 23rd Annual Agricultural Machinery Conference, Cedar Rapids, IA, May 7, 2008. |
| 5. | “Sum- and Difference-Frequency Generation for High-Speed Diode Laser Absorption Spectroscopy,” Gordon Research Conference on Laser Diagnostics in Combustion, Magdalen College, Oxford, England, Aug. 12–17, 2007. |
| 4. | “Optical Diagnostics for Fire Initiation Studies,” Instrumentation Roundtable, Joint Aircraft Survivability Program, Nellis AFB, NV, Sept. 20, 2006. |
| 3. | “Development of a High-Speed Tunable Laser Source for MIR Absorption Spectroscopy of CO, CO2, and H2O,” Gordon Research Conference on Laser Diagnostics in Combustion, South Hadley, MA, July 31–Aug. 5, 2005 (Hot Topics session). |
| 2. | “Terahertz Propulsion Applications,” Terahertz Ohio Workshop, Dayton, OH, Sept. 23, 2005. |
| 1. | “Fundamental Investigations of Turbulent Mixing Using Dual-Tracer Planar Laser-Induced Fluorescence,” 38th AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, Jan. 10–13, 2000 [invited talk for AIAA Foundation Graduate Research Award in Fluid Dynamics]. |

# Book chapters

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| 5. | B.R. Halls, T.R. Meyer, S.J. Grauer, and L. Ma, “Tutorial: Tomographic Imaging in Combustion-Related Flows,” in Optical Diagnostics for Reacting and Non-Reacting Flows: Theory and Practice, Eds. A. Steinberg and S. Roy, AIAA, 1089-1126, 2023; doi.org/10.2514/4.106330. |
| 4. | A. Saha, G. Gunaratne, H. Subramani, T. Yi, T.R. Meyer, and S. Roy, “Analysis of Spatiotemporal Data,” in Optical Diagnostics for Reacting and Non-Reacting Flows: Theory and Practice, Eds. A. Steinberg and S. Roy, AIAA, 1205-1285, 2023; doi.org/10.2514/4.106330. |
| 3. | G. Paniagua, J. Braun, T. Meyer, V. Athmanathan, and S. Roy, “An Oasis of Pure Aerothermal Dilemmas: Integrating Turbines with Rotating Detonation Combustors,” in Progress in Detonation Research, Ed. S. M. Frolov, Torus Press (Moscow), pp. 70-72, 2020; doi.org/10.30826/ICPCD12A27. |
| 2. | T.R. Meyer, M. Brear, S.H. Jin, and J.R. Gord, “Formation and diagnostics of sprays in combustion,” in Handbook of Combustion, Eds. M. Lackner, F. Winter, and A. Agarwal, Wiley-VCH, pp. 291-322, 2010; doi.org/10.1002/9783527628148.hoc031. |
| 1. | C.E. Bunker, J.R. Gord, T.R. Meyer, M.S. Brown, V.R. Katta, D.A. Zweifel, B.A. Harruff, and Y.-P. Sun, “Micro to Nano–Small Research for Fuels and Combustion,” in Surface Engineering: Science and Technology II, Eds. A. Kumar, Y.-W. Chung, J. Moore, G. Doll, K. Yatsui, and D. Misra, TMS (Minerals, Metals & Materials Society), Materials Processing and Manufacturing Division, pp. 25-35, 2002; doi.org/10.1002/9781118788325.ch3. |

# patentS, APPLICATIONS, AND invention disclosures

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| 4. | “Quasi-continuous Burst-mode Laser,” Air Force Research Laboratory Case Number AFD 1364, Invention Disclosure Filed April 9, 2013 (with J.R. Gord, M.N. Slipchenko, S. Roy, and T.R. Meyer). |
| 3. | “A System and Method for Utilizing Pyrolysis Oil in Oil Burners,” Invention Disclosure Filed April 23, 2010, Patent Application Number 13092463, Filed April 22, 2011 (with D.L. Wissmiller, T.R. Meyer, and R.C. Brown). |
| 2. | “Stereoscopic Planar Laser-Induced Fluorescence Imaging for Time-Resolved 3D Movies in Hypersonic Flow,” NASA Case Number LAR 17979-1, Invention Disclosure Filed December 9, 2010 (with P.M. Danehy, N. Jiang, T.L. Medford, S.B. Jones, B.F. Bathel, J.A. Inman, M. Webster, W.R. Lempert, J.D. Miller, and T.R. Meyer). |
| 1. | “Triple-Pump Coherent Anti-Stokes Raman Scattering System,” U.S. Patent No. 7,106,436, Issued September 12, 2006 (with J.R. Gord, S. Roy, T.R. Meyer, M.S. Brown, G.J. Fiechtner, and R.P. Lucht). |

# Peer-reviewed journal Publications

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| 139. | B.R. Halls, N. Rahman, A. Douglawi, T.R. Meyer, and A. Kastengren, “High-Speed X-ray Fluorescence Measurements of Mixing in an Impinging Jet Spray,” Submitted for publication in Opt. Lett. 2025 |
| 138. | A.M. Braun, N.S. Rodrigues, P.M. Danehy, A.R. Suppiah, J. Braun, M.N. Slipchenko, and T.R. Meyer, “Frequency-scanning burst-mode filtered Rayleigh scattering for kHz-rate, multi-parameter, gas-phase measurements,” Opt. Lett. 50(3), 912-915, 2025; doi.org/10.1364/OL.553639. |
| 137. | P. Pal, J. Braun, Y. Wang, V. Athmanathan, G. Paniagua, T.R. Meyer “Numerical study of flow and combustion dynamics in a full-scale hydrogen-air rotating detonation combustor-stator integrated system,” J. Eng. Gas Turbines Power 147(3), 031002, 2024; doi.org/10.1115/1.4066365. |
| 136. | R.B. Wang, A.M. Webb, V. Athmanathan, M.N. Slipchenko, S.P. Kearney, H.D. Perkins, S. Roy, C.A. Fugger, and T.R. Meyer, “500 kHz OH PLIF and OH\* chemiluminescence imaging of deflagration and rotating detonation in CH4-O2 and H2-air mixtures,” Proc. Combust. Inst. 40(1–4), 105770, 2024; doi.org/10.1016/j.proci.2024.105770. |
| 135. | E.L. Braun, K. Patel, V. Athmanathan, T.R. Meyer, S. Roy, and M.N. Slipchenko, “High-energy, low-jitter, narrowband ps probe laser for kHz-rate fs/ps coherent anti-Stokes Raman scattering,” Opt. Lett. 49(8), 2161-2164, 2024; doi.org/10.1364/OL.519396. |
| 134. | A.M. Webb, C.Q. Crabtree, V. Athmanathan, T.R. Meyer, S.P. Kearney, M.N. Slipchenko, “High-efficiency narrow-bandwidth KTP optical parametric oscillator for kHz–MHz planar laser induced fluorescence,” Opt. Lett. 49(6), 1473-1476, 2024; doi.org/10.1364/OL.510334. |
| 133. | A. Saha, J. Crosmer, S. Roy, and T.R. Meyer, “Spatio-temporal dynamics of an acoustically forced cryogenic coaxial jet injector,” Int. J. Multiphas. Flow 170, 104627, 2024; doi.org/10.1016/j.ijmultiphaseflow.2023.104627. |
| 132. | S.P. Kearney, D.K. Lauriola, H.U. Stauffer, P. Hsu, N. Jiang, V. Athmanathan, T.R. Meyer, and S. Roy, “Analysis of picosecond coherent anti-Stokes Raman spectra for gas-phase diagnostics,” J. Opt. Soc. Am. B 40(6), 1611-1624, 2023; doi.org/10.1364/JOSAB.487451. |
| 131. | A.M. Braun, M.N. Slipchenko, J. Leicht, T.R. Meyer, P.M. Danehy, and S. Roy, “Methods to improve burst-mode laser spectral purity for high-speed gas-phase filtered Rayleigh scattering,” Opt. Lett. 48(14), 1-4, 2023; doi.org/10.1364/OL.487369. |
| 130. | N. Rahman, B.R. Halls, S.M. Reardon, T.R. Meyer, and D.R. Guildenbecher, “Sub-resolution modeling of the apparent mass loss in quantitative broadband X-ray radiography,” Measurement 214, 112799(1-9), 2023; doi.org/10.1016/j.measurement.2023.112799. |
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