

TERRENCE R. MEYER

Professor, Purdue University

School of Mechanical Engineering and School of Aeronautics and Astronautics (by courtesy)

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Career Experience

- 2015-present Professor, Mechanical Engineering, Aeronautics and Astronautics (by courtesy), Purdue University, West Lafayette, IN
- Research in aerothermal flows, hypersonics, combustion, and energetics
 - Development of burst-mode kHz-MHz 2D/3D imaging and spectroscopy
- 2010-2020 Guest Professor, Graduate School in Advanced Optical Technologies, Alexander-Friedrich University, Erlangen-Nuremberg, Germany
- High-speed imaging of combustion species using custom tunable laser sources
- 2006-2015 Associate Professor (2012-2015), William and Virginia Binger Assistant Professor (2011-2012), and Assistant Professor (2006-2011), Department of Mechanical Engineering, Iowa State University, Ames, IA
- Diagnostics for multiphase combustion phenomena and high-speed flows
- 2000-2006 Sr. Research Engineer, Innovative Scientific Solutions, Inc., Dayton, OH
- Research in combustion diagnostics for air breathing propulsion engines
 - High-speed laser-based fluorescence, absorption, and coherent Raman
- 2001-2004 Visiting Assistant Professor, EM2C, École Centrale Paris, France
- Particle velocimetry and CH fluorescence in multiphase counterflow flames
- 1994-2000 Graduate Research Assistant, Mechanical Engineering, University of Illinois, Urbana-Champaign, IL (MS earned in 1997, PhD earned in 2001)
- Tracer fluorescence of molecular-scale mixing in turbulent shear layers

Research

Prof. Meyer specializes in advanced multiphase and reacting flow diagnostics for propulsion, high-speed flows, and energetic systems. This includes coherent Raman, fluorescence, phosphorescence, x-ray radiography, scattering techniques, and molecular tagging velocimetry, among others. Applications include measurements in flows related to gas-turbine combustors, rotating detonation engines, rocket injectors, spray-combustion phenomena, novel energetic materials, and hypersonic flows.

Awards

- Editor's Pick, Optics Letters (2020, 2019) and Applied Optics (2019)
- Chair and Vice Chair, Gordon Research Conference on Laser Diagnostics in Energy and Combustion Science (2017-2023)
- Co-Chair, International Constant Volume and Detonation Combustion Workshop, Purdue University (2019)
- Technical Chair, Aerodynamic Measurement Technology (AMT) Committee, AIAA Science and Technology Forum and Exposition (2018-2019)
- Purdue University list of Outstanding Engineering Teachers (2016, 2018, 2019, 2020)
- Fellow, American Society of Mechanical Engineers (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)
- Best Paper, Conference on Lasers and Electro-Optics, Active Optical Sensing (2011)
- General Co-Chair (2010-2012), Program Co-Chair (2008-2010), Optical Society of America Topical Meeting on Laser Applications to Chemical, Security, and Environmental Analysis
- Young Researcher Award and Guest Professorship, Erlangen Graduate School in Advanced Optical Technologies (SAOT) (2010)
- Chair (2009-2010) and Vice-Chair (2008-2009), Optical Society of America Conference on Lasers and Electro-Optics, Subcommittee on Active Optical Sensing
- Cover feature, Applied Optics (2003), Applied Spectroscopy (2007), Applied Optics (2009)
- Associate Fellow, American Institute of Aeronautics and Astronautics (2006)
- AIAA Dayton-Cincinnati Section Outstanding Technical Contribution Award (2003)
- AIAA Foundation Graduate Award in Fluid Dynamics (based on PhD dissertation) (2001)
- Regents of the University of Minnesota Service Award (1992)
- Tau Beta Pi (1990)

Other Relevant Accomplishments

- 110+ journal articles and 2 book chapters, h-index 40, i10-index 91, and 4300+ citations
- Advised or advising 31 PhD, 20 MS, 60+ UG, and 4 post-doctoral researchers
- Research grants of over \$30M, with \$14M as PI and \$14M as Meyer's share

20 Recent Publications

1. D.K. Lauriola, K.A. Rahman, H.U. Stauffer, M.N. Slipchenko, T.R. Meyer, and S. Roy, "Concentration and pressure scaling of CH₂O electronic-resonance-enhanced coherent anti-Stokes Raman scattering signals," *Appl. Opt.* 60(4), 1051-1058, 2021; doi.org/10.1364/AO.415496.
2. B.R. Halls, N. Rahman, K.E. Matusik, T.R. Meyer, and A.L. Kastengren, "Feasibility of X-ray scattering for tracer-free liquid-phase thermometry for multiphase flows," *Fuel* 290, 120040, 2021; doi.org/10.1016/j.fuel.2020.120040.
3. J.M. Fisher, B.C. Chynoweth, M.E. Smyser, A.M. Webb, M.N. Slipchenko, J.S. Jewell, T.R. Meyer, and S.J. Beresh, "Femtosecond laser electronic excitation tagging velocimetry in a Mach six quiet tunnel," *AIAA J.* 59(2), 768-772, 2021; doi.org/10.2514/1.J059879.
4. D.N. Collard, M.S. McClain, N.A. Rahman, N.H. Dorcy, T.R. Meyer, and S.F. Son, "Dynamic x-ray imaging of additively manufactured reactive components in solid propellants," *J. Propul. Power*, published online 2020; doi.org/10.2514/1.B38128.
5. R. Yokoo, K. Goto, J. Kasahara, V. Athmanathan, J. Braun, G. Paniagua, T. Meyer, A. Kawasaki, K. Matsuoka, A. Matsuo, and I. Funaki, "Experimental study of internal flow structures in cylindrical rotating detonation engines," *Proc. Combust. Inst.*, published online 2020; doi.org/10.1016/j.proci.2020.08.001.
6. M.N. Slipchenko, T.R. Meyer, and S. Roy, "Advances in burst-mode laser diagnostics for reacting and nonreacting flows," *Proc. Combust. Inst.*, published online 2020; doi.org/10.1016/j.proci.2020.07.024.
7. J.D. Miller, J.W. Tröger, S.R. Engel, T. Seeger, A. Leipertz, and T.R. Meyer, "CH and NO planar laser-induced fluorescence and Rayleigh-scattering in turbulent flames using

- multimode optical parametric oscillation,” *Appl. Opt.* 60(1), 98-108, 2021; doi.org/10.1364/AO.406237.
8. M.E. Smyser, E.L. Braun, V. Athmanathan, M.N. Slipchenko, S. Roy, and T.R. Meyer, “Dual output fs/ps burst-mode laser for MHz-rate rotational coherent anti-Stokes Raman scattering,” *Opt. Lett.* 45(21), 5933-5936, 2020; doi.org/10.1364/OL.404984.
 9. J.M. Fisher, A.D. Brown, D.K. Lauriola, M.N. Slipchenko, and T.R. Meyer, “Femtosecond laser activation and sensing of hydroxyl for velocimetry in reacting flows,” *Appl. Opt.* 59(34), 10853-10861, 2020; doi.org/10.1364/AO.404788.
 10. P.S. Hsu, M.N. Slipchenko, N. Jiang, C.A. Fugger, A.M. Webb, V. Athmanathan, T.R. Meyer, and S. Roy, “Megahertz-rate OH planar laser-induced fluorescence imaging in a rotating detonation combustor,” *Opt. Lett.* 45(20), 5776-5779, 2020; doi.org/10.1364/OL.403199.
 11. J. Felver, M.N. Slipchenko, E.L. Braun, T.R. Meyer, and Sukesh Roy, “High-energy laser pulses for extended duration MHz-rate flow diagnostics,” *Opt. Lett.* 45(16), 4583-4586, 2020; doi.org/10.1364/OL.400831.
 12. J.M. Fisher, J. Braun, T. R. Meyer, and G. Paniagua, “Application of femtosecond laser electronic excitation tagging (FLEET) velocimetry in a bladeless turbine,” *Meas. Sci. Technol.* 31(6), 064005, 2020; doi.org/10.1088/1361-6501/ab7062.
 13. K.A. Rahman, E.L. Braun, M.N. Slipchenko, S. Roy, and T.R. Meyer “Flexible chirp-free probe pulse amplification for kHz fs/ps rotational CARS,” *Opt. Lett.* 45(2), 503-506, 2020; doi.org/10.1364/OL.382033 (Editor’s Pick).
 14. J. M. Fisher, M.E. Smyser, M.N. Slipchenko, S. Roy, and T.R. Meyer, “Burst-mode femtosecond laser electronic excitation tagging (FLEET) for kHz–MHz seedless velocimetry,” *Opt. Lett.* 45(2), 335-338, 2020; doi.org/10.1364/OL.380109.
 15. M.E. Smyser, M.N. Slipchenko, T.R. Meyer, A.W. Caswell, and S. Roy, “Burst-mode laser architecture for generation of high-peak-power MHz-rate femtosecond pulses,” *OSA Continuum* 2(12), 3490-3498, 2019; doi.org/10.1364/OSAC.2.003490.
 16. B.R. Halls, N. Rahman, M.N. Slipchenko, J.W. James, A. McMaster, M.D.A. Lightfoot, J.R. Gord, and T.R. Meyer, “4D spatiotemporal evolution of liquid spray using kilohertz-rate x-ray computed tomography,” *Opt. Lett.* 44(20), 5013-5016, 2019; doi.org/10.1364/OL.44.005013.
 17. J.A. Tiarks, C.E. Dedic, T.R. Meyer, R.C. Brown, J.B. Michael, “Visualization of physicochemical phenomena during biomass pyrolysis in an optically accessible reactor,” *Journal of Analytical and Applied Pyrolysis* 143, 104667, 2019; doi.org/10.1016/j.jaap.2019.104667.
 18. K.A. Rahman, V. Athmanathan, M.N. Slipchenko, T.R. Meyer, and S. Roy, “Pressure-scaling characteristics of femtosecond, two-photon laser-induced fluorescence of carbon monoxide,” *Appl. Opt.* 58(27), 7458-7465, 2019; doi.org/10.1364/AO.58.007458.
 19. A.D. Casey, Z.A. Roberts, A. Satija, R.P. Lucht, T.R. Meyer, and S.F. Son, “Dynamic imaging of the temperature field within an energetic composite using phosphor thermography,” *Appl. Opt.* 58(16), 4320-4325, 2019; doi.org/10.1364/AO.58.004320 (Editor’s Pick).
 20. A. Douglawi, A. McMaster, M.E. Paciaroni, J.B. Michael, B.R. Halls, J.R. Gord, and T.R. Meyer, “Tracer-free liquid-vapor imaging using lifetime-filtered planar laser-induced fluorescence,” *Opt. Lett.* 44(8), 2101-2104, 2019; doi.org/10.1364/OL.44.002101.