

Mark Christopher Phillips

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Mark C. Phillips is currently an associate research professor at the James C. Wyant College of Optical Sciences, University of Arizona. His research interests include developing new techniques and instrumentation for laser-based spectroscopy and sensing of materials in all phases of matter. He is currently developing and using new swept-wavelength external cavity quantum cascade lasers (ECQCLs) for high-performance infrared spectroscopy and sensing of gases and solids. Applications include standoff chemical plume detection, trace gas sensing, and measurements in extreme environments including combustion and explosive fireballs. He is researching new laser-spectroscopy techniques for measurement of atoms in laser-induced plasma systems, including isotopic resolution and standoff detection capabilities. He is also continuing to develop spectral analysis and optical modeling of atoms and molecules for use in high-temperature plasma and explosive fireball conditions.

He received a Ph.D. in Physics in 2002 from the University of Oregon, where he worked in the lab of Dr. Hailin Wang researching quantum optics in semiconductor systems. Following graduation, Mark was employed as a postdoctoral fellow at Sandia National Laboratory from 2002-2005 and studied quantum coherence effects in semiconductor quantum dots. He was a senior-level scientist at Pacific Northwest National Laboratory (PNNL) from 2005-2018, where he led development of high-performance external cavity quantum cascade laser systems for mid-infrared spectroscopy and sensing, atomic isotope spectroscopy in laser-induced plasmas, and optical modeling of explosive fireballs. From 2019-2024 he was the chief scientist at Opticslah, LLC, where he led efforts toward commercialization of the swept-ECQCL technology and investigated new application areas for laser-based spectroscopy and sensing.

Education & Training

Pacific University	Physics/Mathematics	Honors B.S.	1995
University of Oregon	Physics	Ph.D.	2002
Sandia National Laboratory	Lasers/Optics	Postdoctoral	2002-2005

Research & Professional Experience

2019-present James C. Wyant College of Optical Sciences
The University of Arizona, Tucson, AZ

Title: Associate Research Professor

Responsibilities: Principal investigator, laboratory research and development

Research Areas: Laser spectroscopy and optics, including quantum cascade laser development, trace gas sensor development, infrared laser spectroscopy and sensing, atomic spectroscopy, laser-induced plasma spectroscopy, frequency comb spectroscopy, optical modeling.

2019-2024 Opticslah, LLC., Tucson, AZ
Title: Chief Scientist
Responsibilities: Principal investigator, product development, research and development
Research Areas: Product and application R&D for swept-external cavity quantum cascade lasers, frequency combs, and trace sensing based on atomic/molecular spectroscopy.

2005-2018 Pacific Northwest National Laboratory, Richland, WA
Title: Senior Scientist
Responsibilities: Principal investigator and project manager, laboratory research and development
Research Areas: Laser spectroscopy and optics, including quantum cascade laser development, trace gas sensor development, infrared laser spectroscopy and sensing, infrared photonics, atomic spectroscopy, laser-induced plasma spectroscopy, and standoff explosives detection.

2002-2005 Sandia National Laboratory, Albuquerque, NM
Title: Postdoctoral Appointee
Responsibilities: Laboratory research and development
Research Areas: Quantum interference and ultrafast laser spectroscopy in semiconductor quantum dots, quantum dot laser development

1998-2002 University of Oregon, Eugene, OR
Title: Research Assistant and Ph.D. Candidate
Responsibilities: Laboratory research
Research Areas: Quantum interference and ultrafast laser spectroscopy in semiconductor quantum wells

Professional and scholarly activities

- Professional Society Memberships:
 - Fellow of Optica (2023-present)
 - Optica/Optical Society of America Senior Member (2017-present)
 - Optica/Optical Society of America Member (2001-present)
- Subcommittee chair, *Active Optical Sensing*, OSA Conference on Lasers and Electro-Optics (2015-2017)
- Member of conference organizing committees:
 - OSA Applied Industrial Spectroscopy Conference (2020-2022)
 - OSA Conference on Lasers and Electro-Optics (2012-2017)
 - OSA Optical Instrumentation for Energy and the Environment (2011-2016)
 - SPIE - Photonics West (2014-2016)
- Reviewer for Optics Letters, Optics Express, Optical Engineering, Applied Physics B, Applied Spectroscopy, Photonics, Analytical Chemistry, Spectrochimica Acta B, Journal of Optics and Laser Technology

Mentoring activities

- DOE undergraduate/graduate student interns: 5
- Postdocs: 5
- Graduate students: 2

Awards and Honors

- Optical Society of America Outstanding Reviewer (2020)
- Pacific Northwest National Laboratory, National Security Directorate Technology Development Award (2017)
- Pacific Northwest National Laboratory, National Security Directorate Author of the Year (2014)
- Ph.D. prize for highest score on Ph.D. Qualifier exam, University of Oregon (1997)
- Pacific University Valedictorian, 4.0 GPA (1995)
- Outstanding Senior in the Natural Sciences, Pacific University (1995)
- Cheney Scholarship for Natural Sciences Division, Pacific University (1994-1995)

Patents

B.E. Bernacki and M. C. Phillips, [Toroidal multipass absorption device] US Patent 10,948,408 (2021).

M. S. Taubman, and M. C. Phillips, [Chemical detection and laser wavelength stabilization employing spectroscopic absorption via laser compliance voltage sensing] US Patent 9,236,709 (2016).

M. S. Taubman, and M. C. Phillips, [Methods for determining optical power, for power-normalizing laser measurements, and for stabilizing power of lasers via compliance voltage sensing] US Patent 9,001,854 (2015).

M. S. Taubman, and M. C. Phillips, [Chemical detection and laser wavelength stabilization employing spectroscopic absorption via laser compliance voltage sensing] US Patent 8,675,696 (2014).

Publications

Google Scholar Profile ([Google Scholar page](#))

Citations: >3900

h-index: 34

i10-index: 84

Noteworthy Articles

- 12 Journal Articles selected as Editor's Picks, Featured Articles, Cover Features, or other recognitions (noted in list below).

Peer-Reviewed Journals

1. A. K. Shaik, M. C. Phillips, and S. S. Harilal, "Evolution and persistence of SiO emission in nanosecond laser ablation plumes," *Journal of Physics D: Applied Physics* **57**, 455204 (2024).
2. M. Polek, M. Phillips, F. Beg, and S. Harilal, "Comparison of excitation temperature of a laser-produced plasma by combining emission and absorption spectroscopy," *Aip Adv* **14** (2024).
3. J. J. McCauley, M. C. Phillips, R. R. Weeks, Y. Zhang, S. S. Harilal, and R. J. Jones, "Dual-comb spectroscopy in the deep ultraviolet," *Optica* **11**, 460-463 (2024).
4. E. J. Kautz, A. Zelenyuk, B. Gwalani, M. J. Olszta, M. C. Phillips, M. J. Manard, C. W. Kimblin, and S. S. Harilal, "Impact of environmental oxygen on nanoparticle formation and

- agglomeration in aluminum laser ablation plumes," *The Journal of Chemical Physics* **159** (2023).
5. Mark C. Phillips, Austin Butler, Nick G. Glumac, Michael C. DeMagistris, Morgan Ruesch, Andrea C. Zambon, and Neeraj Sinha, "H₂O and temperature measurements in propagating hydrogen/oxygen flames using a broadband swept-wavelength ECQCL," *Appl. Opt.* **62**, 7643 (2023).
 6. Mark C. Phillips, Elizabeth J. Kautz, and Sivanandan S. Harilal, "Comparison of excitation and kinetic temperatures in a laser-produced plasma using absorption spectroscopy," *Optics Letters* **48**, 1942 (2023).
 7. E. J. Kautz, M. C. Phillips, and S. S. Harilal, "Tantalum oxide and nitride spectral features from a laser-produced plasma," *Spectrochimica Acta Part B: Atomic Spectroscopy* **203**, 106659 (2023).
 8. Mark C. Phillips, Bruce E. Bernacki, Patrick T. Conry, and Michael J. Brown, "Standoff Infrared Measurements of Chemical Plume Dynamics in Complex Terrain Using a Combination of Active Swept-ECQCL Laser Spectroscopy with Passive Hyperspectral Imaging," *Remote Sensing* **14**, 3756 (2022).
 9. S. S. Harilal, M. C. Phillips, D. H. Froula, K. K. Anoop, R. C. Issac, and F. N. Beg, "Optical diagnostics of laser-produced plasmas," *Reviews of Modern Physics* **94**, 035002 (2022).
 10. R. R. D. Weeks, Y. Zhang, S. S. Harilal, M. C. Phillips, and R. J. Jones, "Multi-species temperature and number density analysis of a laser-produced plasma using dual-comb spectroscopy," *J. Appl. Phys.* **131**, 223103 (2022).
 11. E. J. Kautz, M. C. Phillips, A. Zelenyuk, and S. S. Harilal, "Oxidation in laser-generated metal plumes," *Physics of Plasmas* **29**, 053509 (2022). **Editor's Pick**
 12. S. S. Harilal, E. J. Kautz, and M. C. Phillips, "Spatiotemporal evolution of emission and absorption signatures in a laser-produced plasma," *Journal of Applied Physics* **131** (2022). **Editor's Pick**
 13. R. T. Rhoades, R. R. D. Weeks, S. E. Erickson, C. Lecaplain, S. S. Harilal, M. C. Phillips, and R. Jason Jones, "Dual-comb absorption spectroscopy of molecular CeO in a laser-produced plasma," *Optics Letters* **47**, 2502-2505 (2022). **Editor's Pick**
 14. Elizabeth J. Kautz, Emily N. Weerakkody, Mikhail S. Finko, Davide Curreli, Batikan Koroglu, Timothy P. Rose, David G. Weisz, Jonathan C. Crowhurst, Harry B. Radousky, Michael DeMagistris, Neeraj Sinha, Deborah A. Levin, Ed L. Dreizin, Mark C. Phillips, Nick G. Glumac, Sivanandan S. Harilal, "Optical spectroscopy and modeling of uranium gas-phase oxidation: Progress and perspectives," *Spectrochimica Acta Part B: Atomic Spectroscopy* **185**, 106283 (2021). **Invited Review**
 15. Kautz, E.J., M.C. Phillips, and S.S. Harilal, "Laser-induced fluorescence of filament-produced plasmas," *Journal of Applied Physics* **130**(20): 203302 (2021). **Editor's Pick**
 16. Reagan R.D. Weeks, Mark C. Phillips, Yu Zhang, Sivanandan S. Harilal, R. Jason Jones, "Measurement of neutral gadolinium oscillator strengths using dual-comb absorption spectroscopy in laser-produced plasmas," *Spectrochimica Acta Part B: Atomic Spectroscopy* **181**, 106199 (2021).
 17. S. S. Harilal, E. J. Kautz, M. C. Phillips, "Time-resolved absorption spectroscopic characterization of ultrafast laser-produced plasmas under varying background pressures," *Physical Review E* **103**, 013213 (2021).
 18. S. S. Harilal, E. Kautz, R. J. Jones, M. C. Phillips, "Spectro-temporal comparisons of optical emission, absorption, and laser-induced fluorescence for characterizing ns and fs laser-produced plasmas," *Plasma Sources Science and Technology* **30**, 045007 (2021).
 19. N. LaHaye, S. Harilal, M. Phillips, "Early-and late-time dynamics of laser-produced plasmas by combining emission and absorption spectroscopy," *Spectrochimica Acta Part B: Atomic Spectroscopy* **179**, 106096 (2021).

20. Yu Zhang, Reagan R. D. Weeks, Caroline Lecaplain, Sivanandan S. Harilal, Jeremy Yeak, Mark C. Phillips, And R. Jason Jones, "Burst-mode dual-comb spectroscopy," *Optics Letters* **46**, 860 (2021).
21. M. C. Phillips, S. S. Harilal, J. Yeak, R. J. Jones, S. Wharton, and B. E. Bernacki, "Standoff detection of chemical plumes from high explosive open detonations using swept-wavelength external cavity quantum cascade lasers," *Journal of Applied Physics* **128**, 163103 (2020).
22. M. C. Phillips, T. L. Myers, T. J. Johnson, and D. R. Weise, "In-situ measurement of pyrolysis and combustion gases from biomass burning using swept wavelength external cavity quantum cascade lasers," *Optics Express* **28**, 8680 (2020).
23. M. C. Phillips, B. E. Bernacki, S. S. Harilal, J. Yeak, and R. J. Jones, "Standoff chemical plume detection in turbulent atmospheric conditions with a swept-wavelength external cavity quantum cascade laser," *Optics Express* **28**, 7408-7424 (2020).
24. E. J. Kautz, M. C. Phillips, S. S. Harilal, "Unraveling spatio-temporal chemistry evolution in laser ablation plumes and its relation to initial plasma conditions," *Analytical Chemistry* **92**, 13839 (2020).
25. S.S. Harilal, C.M. Murzyn, M.C. Phillips, J.B. Martin, "Hyperfine structures and isotopic shifts of uranium transitions using tunable laser spectroscopy of laser ablation plumes," *Spectrochimica Acta Part B: Atomic Spectroscopy* **169**, 105828 (2020). ***Spectrochimica acta atomic spectroscopy award 2020 (2nd best paper of year)***.
26. E.J. Kautz, J. Yeak, B.E. Bernacki, M.C. Phillips, S.S. Harilal, "The role of ambient gas confinement, plasma chemistry, and focusing conditions on emission features of femtosecond laser-produced plasmas," *Journal of Analytical Atomic Spectrometry* **35**, 1574 (2020). ***Cover Feature***
27. E.J. Kautz, J. Yeak, B.E. Bernacki, M.C. Phillips, S.S. Harilal, "Expansion dynamics and chemistry evolution in ultrafast laser filament produced plasmas," *Physical Chemistry Chemical Physics* **22**, 8304-8314 (2020). ***2020 PCCP HOT Article***
28. M. Phillips, B. Bernacki, S. Harilal, B. Brumfield, J. Schwallier, and N. Glumac, "Characterization of High-Explosive Detonations using Broadband Infrared ECQCL Absorption Spectroscopy," *Journal of Applied Physics* **126**, 093102 (2019). ***Featured Article/News Release***
29. Y. Zhang, C. Lecaplain, R. Weeks, J. Yeak, S. Harilal, M. Phillips, and R. Jones, "Time-resolved dual-comb characterization of a laser-induced plasma," *Optics Letters* **44**, 3458 (2019).
30. M. Burger, P.J. Skrodzki, I. Jovanovic, M.C. Phillips, S.S. Harilal, "Laser-produced uranium plasma characterization and Stark broadening measurements," *Physics of Plasmas* **26** (9), 093103 (2019).
31. P.J. Skrodzki, M. Burger, I. Jovanovic, M.C. Phillips, J. Yeak, B.E. Brumfield, S.S. Harilal, "Plume dynamics and gas-phase molecular formation in transient laser-produced uranium plasmas," *Physics of Plasmas* **26** (8), 083508 (2019). ***Featured Article/News Release***
32. E.J. Kautz, P.J. Skrodzki, M. Burger, B.E. Bernacki, I. Jovanovic, M.C. Phillips, S.S. Harilal, "Time-resolved imaging of atoms and molecules in laser-produced uranium plasmas," *Journal of Analytical Atomic Spectrometry* **34** (11), 2236-2243 (2019). ***Cover Feature***
33. S.S. Harilal, E.J. Kautz, B.E. Bernacki, M.C. Phillips, P.J. Skrodzki, M. Burger, I. Jovanovic, "Physical conditions for UO formation in laser-produced uranium plumes," *Physical Chemistry Chemical Physics* **21** (29), 16161-16169 (2019).
34. P. J. Skrodzki, M. Burger, I. Jovanovic, M. C. Phillips, B. E. Brumfield, and S. S. Harilal, "Tracking of oxide formation in laser-produced uranium plasmas," *Optics Letters*, **43**(20), 5118-5121 (2018).

35. M. C. Phillips, B. E. Brumfield, and S. S. Harilal, "Real-time standoff detection of nitrogen isotopes in ammonia plumes using a swept external cavity quantum cascade laser," *Optics Letters*, **43**(17), 4065-4068 (2018). **Editor's Pick**
36. M. C. Phillips, and B. E. Brumfield, "Standoff detection of turbulent chemical mixture plumes using a swept external cavity quantum cascade laser," *Optical Engineering*, **57**(1), 011003 (2018).
37. S. S. Harilal, B. E. Brumfield, and M. C. Phillips, "An evaluation of equilibrium conditions and temperature-dependent speciation in a laser-produced air plasma," *Physics of Plasmas*, **25**(8), 9 (2018).
38. S. S. Harilal, B. E. Brumfield, and M. C. Phillips, "Standoff analysis of laser-produced plasmas using laser-induced fluorescence," *Optics Letters*, **43**(5), 1055-1058 (2018).
39. S. S. Harilal, B. E. Brumfield, N. L. LaHaye, K. C. Hartig, and M. C. Phillips, "Optical spectroscopy of laser-produced plasmas for standoff isotopic analysis," *Applied Physics Reviews*, **5**(2), 32 (2018).
40. S. S. Harilal, B. E. Brumfield, N. Glumac, and M. C. Phillips, "Elucidating uranium monoxide spectral features from a laser-produced plasma," *Optics Express*, **26**(16), 20319-20330 (2018).
41. J. Bergevin, T. H. Wu, J. Yeak, B. E. Brumfield, S. S. Harilal, M. C. Phillips, and R. J. Jones, "Dual-comb spectroscopy of laser-induced plasmas," *Nature Communications*, **9**, 1273 (2018).
42. M. C. Phillips, B. E. Brumfield, N. LaHaye, S. S. Harilal, K. C. Hartig, and I. Jovanovic, "Two-dimensional fluorescence spectroscopy of uranium isotopes in femtosecond laser ablation plumes," *Scientific Reports*, **7**, 3784 (2017).
43. A. Miloshevsky, M. C. Phillips, S. S. Harilal, P. Dressman, and G. Miloshevsky, "Generation of nanoclusters by ultrafast laser ablation of Al: Molecular dynamics study," *Physical Review Materials*, **1**(6), (2017).
44. K. C. Hartig, S. S. Harilal, M. C. Phillips, B. E. Brumfield, and I. Jovanovic, "Evolution of uranium monoxide in femtosecond laser-induced uranium plasmas," *Optics Express*, **25**(10), 11477-11490 (2017).
45. K. C. Hartig, B. E. Brumfield, M. C. Phillips, and S. S. Harilal, "Impact of oxygen chemistry on the emission and fluorescence spectroscopy of laser ablation plumes," *Spectrochimica Acta Part B-Atomic Spectroscopy*, **135**, 54-62 (2017).
46. S. S. Harilal, P. J. Skrodzki, A. Miloshevsky, B. E. Brumfield, M. C. Phillips, and G. Miloshevsky, "On- and off-axis spectral emission features from laser-produced gas breakdown plasmas," *Physics of Plasmas*, **24**(6), (2017).
47. S. S. Harilal, N. L. LaHaye, and M. C. Phillips, "High-resolution spectroscopy of laser ablation plumes using laser-induced fluorescence," *Optics Express*, **25**(3), 2312-2326 (2017).
48. B. E. Brumfield, and M. C. Phillips, "Quantitative isotopic measurements of gas-phase alcohol mixtures using a broadly tunable swept external cavity quantum cascade laser," *Analyst*, **142**(13), 2354-2362 (2017).
49. P. Skrodzki, N. Shah, N. Taylor, K. Hartig, N. LaHaye, B. Brumfield, I. Jovanovich, M. C. Phillips, and S. S. Harilal, "Significance of plasma-ambient conditions in U absorption and emission features in laser ablation plasmas," *Spectrochimica Acta Part B-Atomic Spectroscopy*, **125**, 112 (2016).
50. N. L. LaHaye, M. C. Phillips, A. M. Duffin, G. C. Eiden, and S. S. Harilal, "The influence of ns- and fs-LA plume local conditions on the performance of a combined LIBS/LA-ICP-MS sensor," *Journal of Analytical Atomic Spectrometry*, **31**(2), 515-522 (2016).
51. S. S. Harilal, J. Yeak, B. E. Brumfield, and M. C. Phillips, "Consequences of femtosecond laser filament generation conditions in standoff LIBS," *Optics Express*, **24**(16), 17941 (2016).

52. S. S. Harilal, J. Yeak, B. Brumfield, and M. C. Phillips, "Dynamics of molecular emission features from nanosecond, femtosecond laser and filament ablation plasmas," *Journal of Analytical Atomic Spectrometry*, **31**, 1192-1197 (2016).
53. S. S. Harilal, N. L. LaHaye, and M. C. Phillips, "Two-dimensional fluorescence spectroscopy of laser-produced plasmas," *Optics Letters*, **41**(15), 3547-3550 (2016).
54. S. S. Harilal, B. E. Brumfield, B. D. Cannon, and M. C. Phillips, "Shock Wave Mediated Plume Chemistry for Molecular Formation in Laser Ablation Plasmas," *Analytical chemistry*, **88**(4), 2296-2302 (2016). **Cover Feature**
55. B. Brumfield, M. Taubman, and M. Phillips, "Rapid and Sensitive Quantification of Isotopic Mixtures Using a Rapidly-Swept External Cavity Quantum Cascade Laser," *Photonics*, **3**(2), 33 (2016).
56. S. S. Harilal, J. Yeak, and M. C. Phillips, "Plasma temperature clamping in filamentation assisted LIBS," *Optics Express*, **23**(21), 27113-27122 (2015).
57. S. S. Harilal, P. K. Diwakar, M. P. Polek, and M. C. Phillips, "Morphological Changes in Ultrafast Laser Ablation Plumes with Varying Spot Size," *Optics Express*, **23**(12), 15608-15615 (2015).
58. S. S. Harilal, P. K. Diwakar, N. L. LaHaye, and M. C. Phillips, "Spatio-temporal evolution of uranium emission in laser-produced plasmas," *Spectrochimica Acta. Part B, Atomic Spectroscopy*, **111**, 1-7 (2015).
59. S. S. Harilal, B. E. Brumfield, and M. C. Phillips, "Lifecycle of laser-produced air sparks," *Physics of Plasmas*, **22**(6), 063301 (2015).
60. S. Harilal, J. Yeak, and M. Phillips, "Plasma temperature clamping in filamentation laser induced breakdown spectroscopy," *Optics Express*, **23**(21), 27113-27122 (2015).
61. S. Harilal, P. Diwakar, M. Polek, and M. Phillips, "Morphological changes in ultrafast laser ablation plumes with varying spot size," *Optics Express*, **23**(12), 15608-15615 (2015).
62. P. K. Diwakar, S. S. Harilal, M. C. Phillips, and A. Hassanein, "Characterization of Ultrafast Laser-Ablation Plasma Plumes at Various Ar Ambient Pressures," *Journal of Applied Physics*, **118**(4), 043305 (2015).
63. I. M. Craig, B. D. Cannon, M. S. Taubman, B. E. Bernacki, R. D. Stahl, J. T. Schiffern, T. L. Myers, and M. C. Phillips, "Sensing of gaseous HF at low part-per-trillion levels using a tunable 2.5- μ m diode laser spectrometer operating at ambient pressure," *Applied Physics B-Lasers and Optics*, **120**(3), 505-515 (2015).
64. B. E. Brumfield, M. S. Taubman, J. D. Suter, and M. C. Phillips, "Characterization of a Swept External Cavity Quantum Cascade Laser For Rapid Broadband Spectroscopy and Sensing," *Optics Express*, **23**(20), 25553-25569 (2015).
65. N. R. Taylor, and M. C. Phillips, "Differential laser absorption spectroscopy of uranium in an atmospheric pressure laser-induced plasma," *Optics Letters*, **39**(3), 594-597 (2014).
66. M. C. Phillips, M. S. Taubman, B. E. Bernacki, B. D. Cannon, R. D. Stahl, J. T. Schiffern, and T. L. Myers, "Real-Time Trace Gas Sensing of Fluorocarbons using a Swept-wavelength External Cavity Quantum Cascade Laser," *Analyst*, **139**(9), 2047-2056 (2014).
67. P. K. Diwakar, S. S. Harilal, A. Hassanein, and M. C. Phillips, "Expansion Dynamics of Ultrafast Laser Produced Plasmas in the Presence of Ambient Argon," *Journal of Applied Physics*, **116**(13), 133301 (2014).
68. I. M. Craig, M. S. Taubman, A. S. Lea, M. C. Phillips, E. E. Josberger, and M. B. Raschke, "Infrared near-field spectroscopy of trace explosives using an external cavity quantum cascade laser," *Optics Express*, **21**(25), 30401-30414 (2013).
69. J. D. Suter, B. E. Bernacki, and M. C. Phillips, "Spectral and angular dependence of mid-infrared diffuse scattering from explosives residues for standoff detection using external cavity quantum cascade lasers," *Applied Physics B. Lasers and Optics*, **108**(4), 965-974 (2012).

70. M. C. Phillips, and M. S. Taubman, "Intracavity Sensing via Compliance Voltage in an External Cavity Quantum Cascade Laser," *Optics Letters*, **37**(13), 2664-2666 (2012).
71. M. C. Phillips, and B. E. Bernacki, "Hyperspectral microscopy of explosives particles using an external cavity quantum cascade laser," *Optical Engineering*, **52**(6), 061302 (2012).
72. N. Carlie, N. C. Anheier, H. Qiao, B. E. Bernacki, M. C. Phillips, L. Petit, J. D. Musgraves, and K. Richardson, "Measurement of the refractive index dispersion of As₂Se₃ bulk glass and thin films prior to and after laser irradiation and annealing using prism coupling in the near- and mid-infrared spectral range," *Review of Scientific Instruments*, **82**(5), Art. No. 053103 (2011).
73. R. A. Cendejas, M. C. Phillips, T. L. Myers, and M. S. Taubman, "Single-mode, narrow-linewidth external cavity quantum cascade laser through optical feedback from a partial-reflector," *Optics Express*, **18**(25), 26037-26045 (2010).
74. B. T. Do, M. C. Phillips, P. A. Miller, M. W. Kimmel, J. Britsch, and S. H. Cho, "Properties of optical breakdown in BK7 glass induced by an extended-cavity femtosecond laser oscillator," *Optics Express*, **17**(4), 2739-2755 (2009).
75. M. C. Phillips, and N. Ho, "Infrared hyperspectral imaging using a broadly tunable external cavity quantum cascade laser and microbolometer focal plane array," *Optics Express*, **16**(3), 1836-1845 (2008).
76. M. C. Phillips, T. L. Myers, M. D. Wojcik, and B. D. Cannon, "External Cavity Quantum Cascade Laser for Quartz Tuning Fork Photoacoustic Spectroscopy of Broad Absorption Features," *Optics Letters*, **32**(9), 1177-1179 (2007).
77. M. D. Wojcik, M. C. Phillips, B. D. Cannon, and M. S. Taubman, "Gas-phase photoacoustic sensor at 8.41 μm using quartz tuning forks and amplitude-modulated quantum cascade lasers," *Applied Physics B-Lasers and Optics*, **85**(2-3), 307-313 (2006).
78. N. Ho, M. C. Phillips, H. Qiao, P. J. Allen, K. Krishnaswami, B. J. Riley, T. L. Myers, and N. C. Anheier, "Single-mode low-loss chalcogenide glass waveguides for the mid-infrared," *Optics Letters*, **31**(12), 1860-1862 (2006).
79. M. C. Phillips, and H. Wang, "Exciton spin coherence and electromagnetically induced transparency in the transient optical response of GaAs quantum wells," *Physical Review B*, **69**(11), 115337 (2004). **Selected for Virtual Journal of Ultrafast Science**
80. A. V. Smith, D. J. Armstrong, M. C. Phillips, R. J. Gehr, and G. Arisholm, "Degenerate type I nanosecond optical parametric oscillators," *Journal of the Optical Society of America B (Optical Physics)*, **20**(11), 2319-28 (2003).
81. M. C. Phillips, H. L. Wang, I. Rumyantsev, N. H. Kwong, R. Takayama, and R. Binder, "Electromagnetically induced transparency in semiconductors via biexciton coherence," *Physical Review Letters*, **91**(18), 183602 (2003). **Selected for Virtual Journal of Ultrafast Science. Selected for Virtual Journal of Nanoscale Science & Technology**
82. M. Phillips, and H. L. Wang, "Electromagnetically induced transparency due to intervalence band coherence in a GaAs quantum well," *Optics Letters*, **28**(10), 831-833 (2003).
83. W. W. Chow, H. C. Schneider, and M. C. Phillips, "Theory of quantum-coherence phenomena in semiconductor quantum dots," *Physical Review A*, **68**(5), 053802 (2003).
84. M. Phillips, and H. L. Wang, "Spin coherence and electromagnetically induced transparency via exciton correlations," *Physical Review Letters*, **89**(18), 186401 (2002). **Selected for Virtual Journal of Ultrafast Science. Selected for Virtual Journal of Nanoscale Science & Technology**
85. T. Meier, S. W. Koch, M. Phillips, and H. L. Wang, "Strong coupling of heavy- and light-hole excitons induced by many-body correlations," *Physical Review B*, **62**(19), 12605-12608 (2000).
86. M. Phillips, and H. L. Wang, "Coherent oscillation in four-wave mixing of interacting excitons," *Solid State Communications*, **111**(6), 317-321 (1999).

Selected Invited Conference Presentations/Colloquia/Seminars

1. "In-situ characterization of combustion in methane flares using standoff infrared laser spectroscopy," Optica Sensing Congress (2024).
2. Global Environmental Measurement and Monitoring (GEMM) Initiative Challenge (panelist), Optica Sensing Congress (2024).
3. "Broadband Infrared Laser Absorption Spectroscopy for Probing Fireball Chemistry," Energetic Materials Gordon Research Conference (2022).
4. "Remote Detection of Chemical Plumes Using Swept-Wavelength External Cavity Quantum Cascade Lasers," Optics and Photonics for Sensing the Environment, Optical Sensors and Sensing Congress (2021).
5. "Infrared laser spectroscopy for rapid chemical sensing," University of Arizona College of Optical Sciences Colloquium (2018).
6. "Characterization of uranium isotopes using laser ablation and tunable laser spectroscopy," OSA Energy and the Environment (2017).
7. "Broadband Spectroscopy and Sensing using Swept External Cavity Quantum Cascade Lasers," OSA Incubator on Precision Measurements in Air Quality and Turbulence (2016).
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