

AMY C SULLIVAN

Department of Physics and Astronomy
Agnes Scott College
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Education

- 2004 – 2008 *University of Colorado at Boulder*
PhD in Physics
Dissertation topic: “Tomographic Characterization of Volume Photopolymers for Integrated Optics” directed by Robert R. McLeod
- 1999 – 2001 *University of Colorado at Boulder*
Master of Science in Physics, Spring 2001
- 1995 – 1998 *Bates College, Lewiston, ME*
Bachelor of Arts in Physics, Fall 1998
Minor in German; Magna Cum Laude
Honor’s thesis: “Simultaneous Trapping of Cs and Rb in a Vapor-Cell MOT” directed by George A. Ruff

International Education

- Mar. – June 1999 *Universität Wien/Central College Abroad, Vienna, Austria*
Coursework all conducted in German, including 20th century German literature, Austrian theater and the history and economics of the European Union.
- Jan. – Feb. 1999 *Goethe Institut, Murnau, Germany*
8-week intensive Germany language course.
- May 1996 *Deutsch-Institut Tirol, Kitzbühel, Austria*
4-week intensive German language course.

Teaching Experience

- 2008 – present Clare Boothe Luce Assistant Professor of Physics
Agnes Scott College, Decatur, GA, Department of Physics & Astronomy
Courses: PHY 102 Elements of Physics, PHY 110L/PHY 111L Introductory Physics Lab, PHY 210 Modern Physics, PHY 352 Optics, FYS Understanding Climate Change. PHY 352 and the FYS are new courses. Developed course modules incorporating our laser radar research tool into all levels of courses.
- 2005 – 2006,
Fall 2007 Volunteer Teaching Assistant
University of Colorado at Boulder, Department of Physics
Conducted weekly, one-hour tutorial classes based on the University of Washington “Tutorials in Introductory Physics” series during which students work through conceptual problems. Tutored three to four hours a week in a Help Room open to all lower level physics students. Corrected homework assignments and proctored exams.

- July 2002 Teaching/Lab Assistant
Center for Talented Youth Summer Camp, Lancaster, PA
Set up introductory laboratory experiments for a summer physics program for talented high school students. Facilitated evening homework help sessions, assisting students in all aspects of the classroom and lab.
- 1999 – 2000 Teaching Assistant
University of Colorado at Boulder, Department of Physics
Conducted four one-hour recitation classes per week, teaching problem solving skills and reviewing concepts that were introduced in a large lecture. Held office hours for four hours per week. Assigned and corrected homework assignments and quizzes.
- Fall 1998 Teaching Assistant
Bates College, Lewiston, ME, Department of Physics & Astronomy
Assisted in introductory laboratory sessions three hours per week. Graded lab notebooks.

Research Experience

- 2008 – present Clare Boothe Luce Assistant Professor
Agnes Scott College
Developing a calibrated optical diffraction tomography system to image waveguides in photopolymers. Mentored Melissa Meister, Mary Hinkle, and Ethan Sudan on this project. Other research mentoring: Shayla Otolorin – senior seminar project on simulating the performance of photonic crystal waveguides. Co-mentored Haviland Forrister and Lauren Guerrido (Spelman college) – summer lidar research.
- Summer 2010 Collaboration with Tom Gaylord, Georgia Tech, Atlanta, GA
Investigated fabrication of photonic crystals using multi-beam interference lithography in collaboration with Tom Gaylord's group in Electrical Engineering. Gained experience with fabrication techniques through the Laboratory Experiences for Faculty Fellowship.
- 2004 – 2008 Graduate Research Assistant
University of Colorado at Boulder, Dept. of Electrical and Computer Engineering.
Developed a 3D direct-write lithography system for writing index structures into volume photopolymers. Developed an optical diffraction tomography system to measure index structures written in the photopolymer in order to characterize the response of the material at high intensities. Used these measurements to optimize the system to write uniform and tapered single mode waveguides and characterize the performance of these guides. Mentored all new and temporary graduates students in the lab.

- 2001 – 2003 Research Engineer I/II
Coherent Technologies, Inc., Louisville, CO (now a part of Lockheed Martin Corporation). Built and characterized tunable, solid state Cr:ZnSe laser systems and diode pumped Tm:YALO lasers. Actively stabilized infrared lasers for coherent lidar applications using Pound Drever Hall locking. Wrote and received SBIR Phase I research grant.
- 2000 – 2001 Professional Research Assistant
Displaytech, Inc., Longmont, CO
Created ellipsometry tests using LabVIEW to characterize the optical properties of liquid crystals for telecommunications applications. Designed a highly polarization sensitive optical system.
- Jan. – May 2000 Graduate Research Assistant
University of Colorado at Boulder, Dept. of Physics
Built and tested a photorefractive electro-optic processor to create carrier-free RF modulation and demonstrated 70 dB of suppression.

Professional Development

- Project Kaleidoscope Workshops, November 2009 & 2010
One day workshops on pedagogy in science disciplines with local faculty.
- Laboratory Experiences for Faculty training in Nanotechnology, June – August 2010
Ten week laboratory training on state of the art nanotechnology clean room equipment.
- Project Kaleidoscope Summer Leadership Institute for Early Career Faculty, July 2010
One week intensive training in positive, productive methods of leadership in academia.
- American Association of Physics Teachers New Faculty Workshop, June 2009
Intensive, four day workshop for new Physics faculty on Physics education research, new methods of pedagogy and effective teaching.
- Physics Diversity Summit participant, March 2009
One day workshop on developing ways of improving diversity in our student body in Physics.
- Colorado Preparing Future Faculty Network Mentorship, 2007
One semester of shadowing a Physics professor at the Colorado School of Mines.

Publications In Peer Reviewed Journals

1. R. R. McLeod, C. D. Anderson, M. C. Cole, K. Kamysiak, A. C. Sullivan, C. Ye, "Optical Wire Bonding of Hybrid Integrated Photonics in a Nonlinear On-Photon Photopolymer," Submitted for publication December 2010.
2. T. F. Scott, B. A. Kowalski, A. C. Sullivan, C. N. Bowman, R. R. McLeod, "Two-Color Single Photon Photoinitiation-Photoinhibition for Sub-Diffraction Photolithography," *Science* **324**, 913 – 917 (2009).
3. A. C. Sullivan and R. R. McLeod, "Tomographic reconstruction of weak, replicated index structures embedded in a volume," *Opt. Express* **15**, 14202-14212 (2007).
4. A. C. Sullivan, M. W. Grabowski, R. R. McLeod, "Three-dimensional direct-write lithography into photopolymer," *Appl. Opt.* **46**, 295–301 (2007).
5. D. Z. Anderson, V. B. Damaio, A. Sullivan, D. Popovic, Z. Popovic, S. Romisch, "-70 dB Optical Carrier Suppression by Two-Beam Coupling in Photorefractive Media," *Appl. Phys. B* **72**, 743–748 (2001).

Patent, Pending

- R. R. McLeod, C. N. Bowman, T. F. Scott, A. C. Sullivan, "Diffraction Unlimited Photolithography," US patent filed Nov 14, 2008.

External Funding

1. *Laboratory Experiences for Faculty Program*, sponsored by the National Nanotechnology Infrastructure Network (NNIN). Total award = \$8,000 for summer stipend.
2. *Laserfest on the Road Outreach Program, "Beam Me Up Scottie!"* Total award = \$6400 in equipment costs to develop an interactive laser outreach program.
3. *Co-Principal Investigator: "Photo-Mask-Based Multi-Beam-Interference Lithography for Wafer-Scale-Integration of Photonic Crystal Devices,"* NSF-ECCS 9/2009 – 8/2012; ; Total Award = \$300,000 to the Georgia Institute of Technology (PI: Thomas Gaylord, Department of Electrical Engineering), sub-award to Agnes Scott College = \$51,000.

Invited Talks

1. University of Georgia, Department of Physics & Astronomy, Athens, GA (2/2010), "3D Phase Imaging of Integrated Optical Devices."
2. Emory University, Department of Physics, Atlanta, GA (10/2009), "3D Phase Imaging of Integrated Optical Devices."
3. Georgia Institute of Technology School of Polymer, Textile and Fiber Engineering, Atlanta, GA (8/2009). "Fabrication and Characterization of 3D Photopolymer Waveguides."
4. Optical Society of America Annual Meeting, *Frontiers in Optics*, Rochester, NY (10/2008). A. C. Sullivan, R. R. McLeod, and M. S. Kirchner, "3-D Micro-Optic Circuits in Holographic Photopolymers," OSA Technical Digest (CD) (Optical Society of America, 2008), paper SThC3.
5. College of Wooster, Wooster, OH (12/2007). "3D Polymer Etch a Sketch: Optical Circuits and Lenseless Imaging".

Conference Abstracts And Proceedings:

Undergraduate student authors are underlined.

1. M. Hinkle, E. Sudan, A. C. Sullivan, "Optical Diffraction Tomography for 3D Characterization of Waveguides in Photosensitive Polymer," *Frontiers in Optics*, Symposium on Undergraduate Research, October 2010, Rochester, NY.
2. H. Forrister, L. Guerrero, and A. C. Sullivan, "Using LIDAR to Observe Thunder and Rainstorm Behavior," *Frontiers in Optics*, Symposium on Undergraduate Research, October 2010, Rochester, NY.
3. L. Sox, A. Mercer, and A. C. Sullivan, "Characterization of pollen particles using LIDAR," *Frontiers in Optics*, Symposium on Undergraduate Research, October 2010, Rochester, NY.
4. M. R. Meister and A. C. Sullivan, "Imaging Waveguides Using Diffraction Tomography," Annual Meeting of the Southeastern Section of the American Physics Society 2009, Atlanta, GA.
5. T. F. Scott, B. A. Kowalski, A. C. Sullivan, C. N. Bowman, R. R. McLeod, "Lithography well below the diffraction limit inspired by STED microscopy," *SPIE 3D and Multi-Dimensional Microscopy: Image Acquisition and Processing 2009*. Invited Paper

6. B. A. Kowalski, T. F. Scott, C. N. Bowman, A. C. Sullivan, and R. R. McLeod "Exceeding the diffraction limit with single-photon polymerization and photo-induced termination," in *Organic 3D Photonics Materials and Devices II*, Susanna Orlic, ed., SPIE 7053, (2008).
7. E. D. Moore, A. C. Sullivan, and R. R. McLeod, "Three-dimensional waveguide arrays via projection lithography into a moving photopolymer," in *Organic 3D Photonics Materials and Devices II*, Susanna Orlic, ed., SPIE 7053, (2008).
8. R. R. McLeod and A. C. Sullivan, "Taper control of radially symmetric gradient-index waveguides in photopolymer," in *Integrated Optics: Devices, Materials, and Technologies XII*, Christoph M. Greiner, Christoph A. Waechte, ed., SPIE 6896 (2008).
9. R. R. McLeod, M. S. Kirchner, and A. C. Sullivan, "3D Micro-Optic Circuits in Holographic Photopolymers," in *Controlling Light with Light: Photorefractive Effects, Photosensitivity, Fiber Gratings, Photonic Materials and More*, Technical Digest (CD) (Optical Society of America, 2007), paper TuC2. Best Student Paper Award.
10. R. R. McLeod, M. S. Kirchner, K. Kamysiak, A. C. Sullivan, M. C. Cole, "3D waveguides with fiber couplers and 90 deg bends in holographic photopolymer," in *Organic 3D Photonics Materials and Devices*, Susanna Orlic and Klaus Meerholz, ed., SPIE 6657, (2007).
11. A. C. Sullivan and R. R. McLeod, "3D Tapered Waveguides in Volume Photopolymers," in *Integrated Photonics and Nanophotonics Research and Applications*, Technical Digest (CD) (Optical Society of America, 2007), paper ItuA7.
12. R.R. McLeod, M. W. Grabowski, M. R. Ayres and A. C. Sullivan, "Localized recording approaches and phase metrology for holographic storage," in *Optical Data Storage*, Bernard Bell, Takeshi Shimano, ed., SPIE 6620 (2007). Invited Paper.
13. A. C. Sullivan, M. W. Grabowski, R. R. McLeod, "Impact of initiation species on index distribution in diffusion photopolymers" in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **6335**, (2006).
14. A. C. Sullivan, M. R. Ayres, R. R. McLeod, "Phase and Absorption Metrology for Thick Photopolymer Devices" in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **6335**, (2006).
15. C. D. Anderson, R. R. McLeod, M. W. Grabowski, and A. C. Sullivan, "Photopolymer Waveguide to Fiber Coupling via 3D Direct-Write Lithography," in *Integrated Photonics Research and Applications/Nanophotonics*, Technical Digest (CD) (Optical Society of America, 2006), paper ItuD4.
16. M. W. Grabowski, A. C. Sullivan, and R. R. McLeod, "3D Direct-Write Waveguides in Diffusion Photopolymers," in *Integrated Photonics Research and Applications/Nanophotonics*, Technical Digest (CD) (Optical Society of America, 2006), paper ItuD5.
17. A. C. Sullivan, R. R. McLeod, and M. W. Grabowski, "Tomographic Reconstruction of 3D Index Structures in Photopolymer," in *Integrated Photonics Research and Applications/Nanophotonics for Information Systems*, Technical Digest (Optical Society of America, 2005), paper ITuA3.
18. A. Zakei, G. J. Wagner, A. C. Sullivan, J. F. Wenzel, W. J. Alford, and T. J. Carrig, "High-Brightness, Rapidly-Tunable Cr:ZnSe Lasers," in *Advanced Solid-State Photonics*, Technical Digest (Optical Society of America, 2005), paper MD2.
19. R. R. McLeod, A. C. Sullivan, M. W. Grabowski, T. Scott, "Hybrid Integrated Optics in Volume Holographic Photopolymer" in *Organic Holographic Materials and Applications II*, Klaus Meerholz, ed., Proc. SPIE **5521**, 55–62 (2004).
20. R. R. McLeod, A. C. Sullivan, and M. Grabowski, "Direct-write waveguides in volume photopolymers," in *Optical Amplifiers and Their Applications/Integrated Photonics Research*, Technical Digest (CD) (Optical Society of America, 2004), paper JWB24.

21. A. C. Sullivan, G. J. Wagner, D. Gwin, R. C. Stoneman, and A. I. R. Malm, "High power Q-switched Tm:YALO lasers," in *Advanced Solid-State Photonics*, Technical Digest (Optical Society of America, 2004), paper WA7.
22. C. P. Hale, A. C. Sullivan, B. G. Tiemann, A. I. R. Malm, D. C. Sadighi, J. W. Hobbs, S. W. Henderson, P. Gatt, C. G. Garvin, "Frequency Stable and Broadly Tunable Master and Local Oscillators for Advanced Eyesafe Coherent Laser Radar Applications," 12th Coherent Laser Radar Conference, Bar Harbor, ME, June 15–20, 2003.
23. W. J. Alford, G. J. Wagner, A. C. Sullivan, J. A. Keene, T. J. Carrig, "High Power and Q-switched Cr:ZnSe Laser," *OSA Trends in Optics and Photonics* vol. 83, *Advanced Solid-State Photonics*, John J. Zayhowski, ed. (Optical Society of America, Washington, DC, 2003), 13–18.
24. D. Anderson, V. Damaio, S. Romisch, A. Sullivan, D. Popovic, and Z. Popovic, "Optical Carrier Suppression Using Two-Beam Coupling in Photorefractive Barium Titanate.," in *Photorefractive Effects, Materials, and Devices*, G. Salamo and A. Siahmakoun, eds., Vol. 62 of *OSA Trends in Optics and Photonics* (Optical Society of America, 2001), paper 94.
25. D. Z. Anderson, V. Damaio, E. Fotheringham, D. Popovic, S. Romisch, A. Sullivan, Z. Popovic, "Optically Smart Active Antenna Arrays", *IEEE Int. Microwave Symp.* 2000, Boston, MA.

Professional Service

- Session chair, *Undergraduate Symposium*, Frontiers in Optics, Rochester, NY, October 2010
- Student Chapter Outreach competition judge, Frontiers in Optics, Rochester, NY, October 2010
- Reviewer for *Optics Letters*, 2010
- Session chair, *Integrated Optics*, Frontiers in Optics, Rochester, NY, October 2009
- Reviewer for *Optics Express*, 2009

Service To The College

- Member of Committee on Academic Standards and Admission, 2010 – present
- Member of Professional Development Committee, Spring 2010
- Member of SpARC committee, 2009 – present
- Interviewer for Scholar's weekend, February 2010
- Facilitated new department research seminar series with monthly outside speakers, 2010 – 2011
- Instituted new second semester introductory Physics assessment for department, Spring 2010
- Admissions volunteer, met with prospective student in Boulder, CO, December 2009
- Graduate school panel, October 2009
- Editor for new Alumnae Newsletter for department, 2009 – present

Professional Memberships

- Optical Society of America, 2004 – present
- American Association of Physics Teachers, 2009 – present
- Project Kaleidoscope, 2009 – present
- American Association for the Advancement of Science, 2009 – present
- American Physical Society, 2008 – present