

Dr. Daniel L. Maser

CONTACT INFORMATION	33 Lab Campus Drive Williamstown, MA 01267	Phone: (413) 597-2735 E-mail: daniel.maser@williams.edu
EDUCATION	University of Colorado Boulder , Boulder, Colorado <i>Department of Physics</i> Ph.D., Physics Advisor: Scott A. Diddams (NIST) Dissertation Title: <i>Generation of Mid-Infrared Frequency Combs for Spectroscopic Applications</i> M.S., Physics (May 2014) GPA 3.7/4.0 Master's Thesis: <i>Observational Evidence of Dark Energy</i> (literature review) University of California, Berkeley , Berkeley, California B.A., Physics High Honors in Physics, Distinction in General Scholarship, GPA: 3.8/4.0 Honors Thesis: <i>Detection of a single cobalt microparticle with a microfabricated atomic magnetometer</i>	August 2017 May 2011
HONORS AND AWARDS	Emil Wolf Student Paper Competition Winner Honorable Mention: National Science Foundation Graduate Research Fellowship Phi Beta Kappa (academic honor society)	2015 2012 2011
RESEARCH EXPERIENCE	Williams College , Williamstown, Massachusetts <i>Postdoctoral Research Fellow, Majumder Group</i> I primarily work in the laboratory of Professor Protik Majumder, a physics professor and the Director of the Williams College Science Center. Our research centers around high-precision measurements of atomic transitions in heavy Group IIIA and Group IIIB atoms (such as indium and lead) in order to test and refine the accuracy of atomic wavefunctions in high- Z , multi-valence systems. My day-to-day tasks range from machining and optical alignment to writing software for data acquisition and analysis. My other duties involve advising students, both seniors concluding their thesis projects, and summer students just finishing their freshman years who are beginning their first experience in a laboratory. In addition, I oversaw the move of the laboratory from our decommissioned science center to a newly constructed science facility from March to May. Professor Majumder served as the interim president of Williams College from January through June, during which I performed each of these tasks largely independently. National Institute of Standards and Technology (NIST) , Boulder, Colorado <i>Graduate Research Assistant, Opt. Freq. Meas. Group</i> My graduate work primarily focused on the Generation of optical frequency combs at mid-infrared wavelengths for precision measurements of trace gas concentrations in the atmosphere. This included the modeling and developing of ultrafast fiber lasers and nonlinear frequency conversion. JILA (University of Colorado Boulder and NIST) , Boulder, Colorado <i>Graduate Research Assistant, Anderson Group</i> I worked on the development an atom-based sensor for measuring acceleration and rotation (gyroscope) by measuring the Sagnac phase shift between two coherent Bose-Einstein condensates.	October 2017 - Present November 2012 - May 2017 August 2011 - July 2012

Physical Sciences, Inc., Andover, Massachusetts

Co-op, Sensor Applications Group **May - August 2010 and May - August 2011**

Our group conducted diode laser gain spectroscopy on alkali-rare gas systems using the DPAL (diode-pumped alkali laser) technique, which entails pumping on the D₂ line of an alkali atom in order to induce transparency or optical gain on the D₁ line.

University of California, Berkeley, Berkeley, California

Undergraduate Research Apprentice, Budker Group **September 2009 - May 2011**

I used a microfabricated atomic magnetometer to detect microscopic magnetized particles in order to establish a lower threshold detection limit; samples included micron-scale cobalt particles and dissected Monterey Bay sea slugs.

Infrasense, Inc., Arlington, Massachusetts

Civil Engineering Assistant **June - August 2005 and June - August 2006**

I collected and analyzed data of subsurface deterioration of roads and bridges using ground penetrating radar.

TEACHING
EXPERIENCE

Williams College, Williamstown, Massachusetts

Adjunct Instructor **January 2019 (scheduled)**

I will be teaching a hands-on course in electronics for students from all years and disciplines during Williams College's Winter Study, a one-month period in which students take one pass/fail course for several hours per week in order to encourage students to explore subject areas outside of their intended fields of study. The course will begin with introductory analog circuitry, continue through transistors and operational amplifiers, and conclude with a digital electronics project with the assistance of the college Science Center's instrumentation engineer.

BuffTutor Network, Boulder, Colorado

Academic Tutor **January 2015 - May 2017**

I tutored introductory calculus- and algebra-based physics to University of Colorado undergraduate students.

University of Colorado Boulder, Boulder, Colorado

Teaching Assistant **August - December 2012**

I taught and graded for Physics 2010 (Introductory Algebra-based Physics I) and graded for Physics 3310 (Electrodynamics I for majors).

University of California Marching Band, Berkeley, California

Teaching Assistant **August - December 2010**

I instructed and reviewed Cal Band marching technique for both incoming and returning marching band members in preparation for the football season, and taught field shows in advance of each home game.

Director's Assistant

January - December 2008

I was one of two section leaders for the Cal Band clarinet section. Instructed and prepared the section musically for each new field show, acted as a liaison between the section and band leadership, and also served as social leader for the section.

College Academy & College Gate, South Easton, Massachusetts

Classroom Instructor

June - July 2009

I taught electricity and engineering courses at an academic enrichment summer camp for elementary and middle school-aged children.

COMPUTER SKILLS **Languages:** Python, Mathematica, MATLAB, LabVIEW.
 Applications: L^AT_EX, Microsoft Office, Origin, Inkscape.

TECHNICAL SKILLS • Numerous techniques for atomic and molecular spectroscopy at visible, near-infrared, and mid-infrared wavelengths.
 • Programming software for experimental control and data acquisition, both in command-line and as graphical user interfaces.
 • Laser light coupling and transport with optical fibers.
 • Numerical modeling of optical and atomic physical processes.
 • Generation of laser light using nonlinear optical processes.
 • Design and construction of ultrafast fiber systems using arc fusion splice techniques.
 • Alignment and optimization of free-space optical systems.
 • Machining of aluminum and steel using mill, lathe, and other machinery.
 • Design and construction of analog circuitry.
 • Experience with various laboratory electronics.

PROFESSIONAL SOCIETIES • Optical Society of America
 • American Physical Society

PUBLICATIONS A. S. Kowligy, D. D. Hickstein, A. Lind, D. R. Carlson, H. Timmers, N. Nader, D. L. Maser, D. Westly, K. Srinivasan, S. B. Papp, and S. A. Diddams, “Tunable mid-infrared generation via wide-band four-wave mixing in silicon nitride waveguides.” *Optics Letters* **43**, 4220 (2018). DOI: 10.1364/OL.43.004220

N. Nader, D. L. Maser, F. C. Cruz, A. Kowligy, H. Timmers, J. Chiles, C. Fredrick, D. A. Westly, S. W. Nam, R. P. Mirin, J. M. Shainline, and S. Diddams, “Versatile silicon-waveguide supercontinuum for coherent mid-infrared spectroscopy.” *APL Photonics* **3**, 036102 (2018). DOI: 10.1063/1.5006914

N. B. Vilas, B.-Y. Wang, P. M. Rupasinghe, D. L. Maser, M. S. Safronova, U. I. Safronova, and P. K. Majumder, “High-precision measurements and theoretical calculations of indium excited-state polarizabilities.” *Physical Review A* **97**, 022507 (2018). DOI: 10.1103/PhysRevA.97.022507

D. L. Maser, G. Ycas, W. I. Depetri, F. C. Cruz, and S. A. Diddams, “Coherent Frequency Combs for Spectroscopy Across the 3 to 5 Micron Region.” *Applied Physics B* **123** 5, 142 (2017). DOI: 10.1007/s00340-017-6714-y

A. Klose, G. Ycas, F. C. Cruz, D. L. Maser, and S. A. Diddams, “Rapid, broadband spectroscopic temperature measurement of CO₂ using VIPA spectroscopy.” *Applied Physics B* **122** 4, 78 (2016). DOI: 10.1007/s00340-016-6349-4

F. C. Cruz, D. L. Maser, T. Johnson, G. Ycas, A. Klose, F. R. Giorgetta, I. Coddington, and S. A. Diddams, “Mid-infrared optical frequency combs based on difference frequency generation for molecular spectroscopy.” *Optics Express* **22**, 26814 (2015). DOI: 10.1364/OE.23.026814

A. Klose, G. Ycas, D. L. Maser, and S. A. Diddams, “Tunable, stable source of femtosecond pulses near 2 μ m via supercontinuum of an Erbium mode-locked laser.” *Optics Express* **22**, 28400 (2014). DOI: 10.1364/OE.22.028400

D. Maser, “Shedding light on dark energy.” *The Student Blog, The Public Library of Science (PLOS)* (2014).
blogs.plos.org/thestudentblog/2014/02/11/shedding-light-dark-energy/

K. L. Galbally-Kinney, D. L. Maser, W. J. Kessler, W. T. Rawlins, and S. J. Davis, “Measurements and imaging of optical gain in optically pumped alkali-rare gas systems.” *Applied Physics Letters* **100**, 041110 (2012). DOI: 10.1063/1.3679613

D. Maser, S. Pandey, H. Ring, M. P. Ledbetter, S. Knappe, J. Kitching, and D. Budker, “Note: Detection of a single cobalt microparticle with a microfabricated atomic magnetometer.” *Review of Scientific Instruments* **82**, 086112 (2011).
DOI: 10.1063/1.3626505

POSTER
PRESENTATIONS

D. L. Maser, B.-Y. Wang, N. B. Vilas, P. M. Rupasinghe, M. S. Safronova, U. I. Safronova, and P. K. Majumder, “High-precision measurements and theoretical calculations of indium excited-state polarizabilities.” *DAMOP 2018*.
Link: meetings.aps.org/Meeting/DAMOP18/Session/T01.158

D. L. Maser, G. Ycas, F. C. Cruz, and S. A. Diddams, “Coherent Frequency Combs for Spectroscopy Spanning 3 to 5.2 μm .” *Frontiers in Optics 2016*.
DOI: 10.1364/FIO.2016.JTh2A.85

D. L. Maser, L. Nugent-Glandorf, G. Ycas, F. Adler, K. Knabe, and S. A. Diddams, “Doubly-resonant mid-infrared AgGaSe₂ optical parametric oscillator.” *CLEO: 2014*. DOI: 10.1364/CLEO_AT.2014.JTu4A.110

ORAL
PRESENTATIONS

D. L. Maser, F. C. Cruz, G. Ycas, T. Johnson, A. Klose, F. Giorgetta, L. C. Sinclair, I. Coddington, N. R. Newbury, and S. A. Diddams, “Dual-Comb Spectroscopy with Difference-Frequency-Generated Mid-Infrared Frequency Combs.” *Frontiers in Optics 2015*.
DOI: 10.1364/FIO.2015.FTu2E.3

PROCEEDINGS

K. L. Galbally-Kinney, D. L. Maser, W. J. Kessler, W. T. Rawlins, and S. J. Davis, “Optical gain and excitation phenomena in optically pumped alkali atom-rare gas mixtures.” *Proceedings of SPIE* **8238**, 823805 (2012). DOI: 10.1117/12.912863

K. L. Galbally-Kinney, D. L. Maser, W. J. Kessler, W. T. Rawlins, and S. J. Davis, “Small signal gain in DPAL systems.” *Proceedings of SPIE* **7915**, 791508 (2011).
DOI: 10.1117/12.877272

VOLUNTEER WORK **Rocky Mountain Golden Bears**, Denver, Colorado

Board Member, Athletics Coordinator

August 2013 - May 2017

Volunteering as a board member of the Rocky Mountain Golden Bears, the California Alumni Club of Colorado and Wyoming. Coordinating alumni events with the university athletics department, admissions department, and local alumni to help attract prospective students and foster a community among University of California alumni, both locally and around the country.