

N. DANIEL GIBSON, Ph.D.

EDUCATION

Ph.D. in Physics, University of Virginia, Charlottesville, Virginia, September 1992.

Thesis - "*Photodetachment of Negative Ions in a Static Electric Field*"

B.S. in Physics with High Distinction, University of Virginia, Charlottesville, Virginia, May 1987.

Honors Thesis - "*Two-tone Frequency Modulation Spectroscopy of Rubidium Vapor*"

SUMMARY OF QUALIFICATIONS

Teaching experience includes over twenty-five years of teaching, supervising and mentoring physics and mathematics students of a wide range of abilities in both the classroom and the laboratory.

- Love of teaching, use of demonstrations and hands-on interactions with students have led to consistent recognition for excellence in instruction.

Experimental atomic physics experience spans thirty years with concentrations in the areas of negative ions, lasers, electron-atom and ion-atom collisions, plasma physics, x-ray, visible, uv and ir spectroscopy.

GRANTS AND AWARDS

- *RUI: Structure and Dynamics of Negative Ions* – National Science Foundation Physics- Atomic and Molecular Structure 2017, N. Daniel Gibson and C. W. Walter, \$344,000.
- *Negative Ion Photodetachment Spectroscopy* – National Science Foundation Physics- Atomic and Molecular Structure 2014, N. Daniel Gibson and C. W. Walter, \$308,862.
- *Valence and Inner Shell Negative Ion Photodetachment Spectroscopy* – National Science Foundation Physics - 2011, N. Daniel Gibson and C. W. Walter, \$274,000.
- *Valence and Inner Shell Negative Ion Spectroscopy* - National Science Foundation (NSF) Physics- Atomic and Molecular Structure 2008, N. Daniel Gibson and C. W. Walter, \$283,000.
- *Oscillator Strengths for Ultraviolet Atomic and Molecular Transitions* - NASA 2005, S. R. Federman, N. D. Gibson, R. M. Schectman, S. Chen and D. G. Ellis, \$25,584.
- *Structure and Spectroscopy of Negative Ions* - National Science Foundation (NSF) Physics- Atomic and Molecular Structure 2005, C. W. Walter and N. Daniel Gibson, \$279,477.
- *Spectroscopy and Structure of Negative Ions* - National Science Foundation (NSF) Physics- Atomic and Molecular Structure 2002, C. W. Walter and N. Daniel Gibson, \$224,527.
- *Oscillator Strengths for Ultraviolet Atomic and Molecular Transitions* - NASA 2001, S. R. Federman, S. Chen, N. D. Gibson, and R. M. Schectman, \$32,900.
- *Laser Spectroscopy of Negative Ions* - National Science Foundation (NSF) AMO Physics 1998, C. W. Walter and N. Daniel Gibson, \$224,460.
- *Optical and Laser Spectroscopy Instrumentation for Research and Education* - NSF MRI 1998, C. W. Walter, K. A. Coplin, N. Daniel Gibson and M. E. Mickelson, \$200,916.
- *Oscillator Strengths for Ultraviolet Atomic and Molecular Transitions* - NASA 1998, S. R. Federman, S. Chen, N. D. Gibson, K. L. Menningen, and R. M. Schectman, \$24,038.
- *Oscillator Strengths and Branching Fractions in the UV* – National Institute of Standards and Technology Equipment grant - 1998, N. D. Gibson, \$27,770.
- *Oscillator Strengths for Ultraviolet Atomic and Molecular Transitions* - NASA 1997, S. R. Federman, S. Chen, N. D. Gibson, K. L. Menningen, and R. M. Schectman, \$14,800.
- *Branching Fractions in the UV and VUV* - High Precision atomic and ionic data for high priority atomic physics and astrophysics needs - Research Corporation 1997, N. Daniel Gibson, \$39,995.

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ACADEMIC EXPERIENCE

Dean of the Faculty, Denison University, Granville, Ohio, July 2019 – June 2022.

Professor, Denison University, Granville, Ohio, September 2008 – on.

- Faculty Appeals Committee, 2015 – 2018, Chair 17-18.
- Selections and Elections Committee, 2017 - 2019.
- Chair, Science Chairs Committee, 2016 – 2017.
- J. Reid Anderson Distinguished Professor in Physics, 2015 – 2021.
- Director, Oak Ridge Science Semester off-campus program for 27 colleges July 2004 – 2020.
- Chair, Accommodations Review Board, 2014 – 2015.
- Director of Career Development Search, 2014.
- Student Commencement speaker selection committee 2013 – 2016.
- Chair, University Council, 2010 – 2012.
- Chair, Department of Physics and Astronomy, 2008 – 2012, 2015 - 2018.
- President, Denison chapter of Sigma Xi, Interdisciplinary Scientific Research Society, 1999–2019.
- Faculty Advisor, Society of Physics Students, 2007 – 2014, 2016 - 2017.
- Mentor, SPS Outreach group, Physics demonstrations shows to 200+ students per year.
- International and Off-campus Education Committee of the GLCA, 2003 – on.
- Personnel Committee, 2008 – 2010, Vice-Chair and University Council Representative 2009 - 10.
- Faculty Representative, Board of Trustees Student Enrollment Committee, 2012 – 2014.
- Faculty Representative, Board of Trustees Academic Affairs Committee, 2009 – 2012.

John and Christine Warner Professor, Denison University, Granville, Ohio, July 2004 - August 2007.

- Faculty Representative, Board of Trustees Student Affairs Committee, 2004 – 2006.
- Dean of Students Search Committee, 2006 - 07.
- Selections and Elections Committee, 2005 - 08.
- Finance Committee, 2006-2009, Chair 2007 - 08.
- Physical Chemist search, 2006 - 07.

Associate Professor, Denison University, Granville, Ohio, September 2002 - 2008.

- Develop innovative liberal arts Quantum Mechanics course.
- Chair, Finance Committee of the University Council, 2002 - 04.
- Teach advanced experimental physics course and develop new, modern experiments.
- University Council, 2001 - 02.

Assistant Professor, Denison University, Granville, Ohio, August 1996-August 2002.

- Taught calculus based introductory physics, modern physics and quantum mechanics using interactive teaching methods and peer instruction techniques.
- Created new Denison course – “The Way Things Work,” primarily for non-science majors.
- Instituted use of Interactive Physics III and other educational software.

Visiting Professor, University of Wisconsin, Madison, Wisconsin, June 1996 - August 1996.

REFEREED JOURNAL ARTICLES

43. "Inner-Shell Photodetachment from Ni^- : A Giant Feshbach Resonance," I. Dumitriu, R. C. Bilodeau, T. W. Gorczyca, C. W. Walter, N. D. Gibson, D. Rolles, Z. D. Pešić, A. Aguilar, and N. Berrah, **Physical Review A** **96**, 023405 (2017).
42. "Candidate for Laser Cooling of a Negative Ion: Observations of Bound-Bound Transitions in La^- ," C.W. Walter, N.D. Gibson, D.J. Matyas, C. Crocker, K.A. Dungan, B.R. Matola, and J. Rohlen, **Physical Review Letters**, **113**, 063001 (2014).
41. "Single-Photon Multiple Detachment in Fullerene Negative Ions: Absolute Ionization Cross Sections and the Role of the Extra Electron," R.C. Bilodeau, N.D. Gibson, C.W. Walter, D.A. Esteves-Macaluso, S. Schippers, A. Muller, R. Phaneuf, A. Aguilar, M. Hoener, J. M. Rost and N. Berrah, **Physical Review Letters**, **111**, 043003 (2013).
40. "Inner-shell Photodetachment: Shape and Feshbach Resonances of Anions" R.C. Bilodeau, N. D. Gibson, C. W. Walter, A. Aguilar and N. Berrah, **Journal of Electron Spectroscopy and Related Phenomena**, **185(8-9)**, 219-225 (2012).
39. "Experimental and theoretical study of bound and quasibound states of Ce^- ," C.W. Walter, N.D. Gibson, Y.-G. Li, D.J. Matyas, R.M. Alton, S.E. Lou, R.L. Field III, D. Hanstorp, Lin Pan and D. Beck, **Physical Review A**, **84**, 032514 (2011).
38. "Inner-Shell Photodetachment from Ru^- " I. Dumitriu, R. C. Bilodeau, T. W. Gorczyca, C. W. Walter, N. D. Gibson, Z. D. Pešić, D. Rolles, and N. Berrah, **Physical Review A**, **82**, 043434 (2010).
37. "Electron affinity of indium and the fine structure of In- measured using infrared photodetachment threshold spectroscopy" C.W. Walter, N.D. Gibson, D.J. Carman, Y.-G. Li, and D.J. Matyas, **Physical Review A**, **82**, 032507 (2010).
36. "Inner-shell Photodetachment from Fe^- ," I. Dumitriu, R.C. Bilodeau, T. W. Gorczyca, C.W. Walter, N.D. Gibson, A. Aguilar, Z. Pesic, D. Rolles, and N. Berrah, **Physical Review A**, **81**, 053404, (2010).
35. "Depletion of the excited state population in negative ions using laser photodetachment in a gas-filled RF quadrupole ion guide" A. O. Lindahl, D. Hanstorp, O. Forstner, N.D. Gibson, T. Gottwald, K. Wendt, C. C. Havener and Y. Liu, **Journal of Physics B**, **43**, 115008 (2010).
34. "Promoting a core electron to fill a d shell: A threshold law and shape and Feshbach resonances," R.C. Bilodeau, I. Dumitriu, N.D. Gibson, C.W. Walter, and N. Berrah, **Physical Review A**, **80**, 031403 (2009).
33. "Electron affinity of arsenic and the fine structure of As- measured using infrared photodetachment threshold spectroscopy" C.W. Walter, N.D. Gibson, R.L. Field III, A.P. Snedden, J.P. Shapiro, C.M. Janczak, and D. Hanstorp, **Physical Review A**, **80**, 014501 (2009).
32. "Selective detection of ^{13}C by laser photodetachment mass spectrometry" P. Andersson, J. Sandström, D. Hanstorp, N.D. Gibson, K. Wendt, D.J. Pegg and R. D. Thomas, **Nuclear Instruments and Methods in Physics Research B**, **266**, 3667 (2008).

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31. “*Experimental Investigation of electron impact on Si_2^-* ,” A. O. Lindahl, P. Andersson, G. F. Collins, D. Hanstorp, D. J. Pegg, M. Danielsson, W. D. Geppert, M. Hamberg, R. D. Thomas, V. Zhaunerchyk, C. Diehl, N. D. Gibson and A. Källberg, **Physical Review A**, **77**, 022710 (2008).
30. “*Infrared Photodetachment of Ce^- : Threshold Spectroscopy and Resonance Structure*,” C.W. Walter, N.D. Gibson, C.M. Janczak, K.A. Starr, A.P. Snedden, R.L. Field III and P. Andersson, **Physical Review A**, **76**, 052702 (2007).
29. “*Shape Resonances in the absolute K-shell Photodetachment of B⁻*,” N. Berrah, R.C. Bilodeau, I. Dumitriu, J. D. Bozek, N. D. Gibson, C. W. Walter, G. Ackerman, O. Zatsarinny and T. W. Gorczyca, **Physical Review A**, **76**, 032713 (2007).
28. “*Double Auger decay, Feshbach and shape resonances in negative ions*,” N. Berrah, R.C. Bilodeau, J. D. Bozek, C. W. Walter, N. D. Gibson, and G. D. Ackerman, **Radiation Physics and Chemistry**, **75**, 1447-1450, 2006.
27. “*Photo Double Detachment of CN^- : Electronic Decay from an Inner-valence Hole in Molecular Anions*,” R.C. Bilodeau, C.W. Walter, I. Dumitriu, N.D. Gibson, G.D. Ackerman, J.D. Bozek, B.S. Rude, R. Santra, L.S. Cederbaum, and N. Berrah, **Chemical Physics Letters**, **426**, 237-241, 2006.
26. “*Shape Resonance in K-shell Photodetachment from C⁻*,” C. W. Walter, N. D. Gibson, R.C. Bilodeau, N. Berrah, J. D. Bozek, G. Ackerman, and A. Aguilar, **Physical Review A**, **73**, 062702, 2006.
25. “*Radiative Lifetimes of metastable states of negative ions*,” P. Andersson, K. Fritioff, J. Sandström, G. F. Collins, D. Hanstorp, A. Ellman, P. Schef, P. Lundin, S. Mannervik, P. Royen, C. Froese Fischer, F. Österdahl, D. Rostohar, D. J. Pegg, N. D. Gibson, H. Danared, and A. Källberg, **Physical Review A**, **73**, 032705, 2006.
24. “*High Charge State Formation in Inner-shell Photodetachment of S⁻*,” R.C. Bilodeau, N. D. Gibson, J. D. Bozek, C. W. Walter, G. Ackerman, P. Andersson, J. G. Heredia, M. Perri and N. Berrah, **Physical Review A**, **72**, 050701(R), 2005.
23. “*Inner-shell Photodetachment Thresholds: Unexpected Long-range Validity of the Wigner Law*,” R.C. Bilodeau, J. D. Bozek, N. D. Gibson, C. W. Walter, G. Ackerman, I. Dumitriu and N. Berrah, **Physical Review Letters**, **95**, 083001, 2005.
22. “*Oscillator Strengths for Ultraviolet Transitions in Cl II and III*,” R. M. Schectman, S. R. Federman, M. Brown, S. Cheng, M. C. Fritts, R. E. Irving and N. D. Gibson, **Astrophysical Journal**, **621**, 1159, 2005.
21. “*The observation of an excited C_2^- ion*,” K. Fritioff, J. Sandström, P. Andersson, D. Hanstorp, F. Hellberg, R. Thomas, M. Larsson, F. Österdahl, G. F. Collins, A. Le Padellec, D. J. Pegg, N. D. Gibson, H. Danared, and A. Källberg, **Journal of Physics B**, **37**, 2241-2246, 2004.
20. “*The radiative lifetime of a bound excited state of Te^-* ,” A. Ellmann, P. Schef, P. Lundin, K. Fritioff, P. Andersson, D. Hanstorp, C. Froese Fischer, F. Österdahl, D. J. Pegg, N. D. Gibson, H. Danared, and A. Källberg, **Physical Review Letters**, **92**, 253002-1, 2004.
19. “*Single and double detachment from H⁻*,” K. Fritioff, J. Sandström, P. Andersson, D. Hanstorp, F. Hellberg, R. Thomas, W. Geppert, M. Larsson, F. Österdahl, G. F. Collins, D. J. Pegg, H. Danared, A. Källberg, and N. D. Gibson, **Physical Review A**, **69**, 042707, 2004.
18. “*K-Shell Photodetachment from C⁻: Experimental Results and Theory*,” N. D. Gibson, C. W. Walter, O. Zatsarinny, T. W. Gorczyca, G. Ackerman, J. D. Bozek, M. Martins, B. M. McLaughlin and N. Berrah, **Physical Review A**, **67**, 030703(R), 2003.

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17. "S-wave Photodetachment from S^- ions in a static electric field," N. D. Gibson, M. D. Gasda, K. A. Moore, D. A. Zawistowski, and C. W. Walter, *Rapid Comm.*, **Physical Review A**, **64**, 061403(R), 2001.
16. "K-Shell Photodetachment of Li^- Negative Ions: Experiment and Theory," N. Berrah, J. D. Bozek, A. A. Wills, G. Turri, H. L. Zhou, S. T. Manson, G. Ackerman, B. Rude, N. D. Gibson, C. W. Walter, L. VoKy, A. Hibbert and S. Fergusson, **Physical Review Letters**, **87**, 253002, 2001.
15. "Branching ratio measurement of N^+ inter-system lines, $2s2p^3\ ^5S_2-2s^22p^2\ ^3P_{2,1}$ " J.J. Curry, N. D. Gibson, and J. E. Lawler, **Astronomy and Astrophysics**, **321**, pp. 1021-1023, 1997.
14. "Investigation of the 147 nm radiative efficiency of Xe surface wave discharges," N. D. Gibson, U. Kortshagen and J.E. Lawler, **Journal of Applied Physics**, **81**, No. 3, pp. 1087-1092, 1997.
13. "Radiative lifetimes in Cr I by laser-induced fluorescence," J.C. Cooper, N. D. Gibson and J.E. Lawler, **Journal of Quantitative Spectroscopy and Radiative Transfer**, **58**, No. 1, pp. 85-92, 1997.
12. "Atomic Data for the Re II Resonance Multiplet and its Application to Astrophysics," G.M. Wahlgren, S.G. Johansson, U. Litzén, N. D. Gibson, J.C. Cooper, J.E. Lawler, D.S. Leckrone and R. Engleman, Jr, **Astrophysical Journal**, **475**, pp. 380-386, 1997.
11. "A Radiometric Investigation of low pressure rf sulfur discharges," N. D. Gibson, U. Kortshagen and J.E. Lawler, **Journal of Applied Physics**, **79**, No. 10, pp. 7523-7528, 1996.
10. "On the E-H-mode transition in RF inductive discharges," U. Kortshagen, N. D. Gibson, and J.E. Lawler, **Journal of Physics D**, **29**, pp. 1224-1236, 1996.
9. "A Radiometric and Electrical Characterization of low pressure dc positive column sulfur discharges," N. D. Gibson and J.E. Lawler, **Journal of Applied Physics**, **79**, No. 1, p. 86-92, 1996.
8. "Absolute measurements of optical oscillator strengths of noble gas resonance lines," N. D. Gibson and J.S. Risley, **Physical Review A**, **52**, No. 6, pp. 4451-6, 1995.
7. "On the formation of $H(n=3)$ dipole moments in collisions of protons on rare gas atoms," N. Seifert, N. D. Gibson, S.P. Renwick, and J.S. Risley, **Zeitschrift für Physik**, **35**, No. 4, p. 231.
6. "Experimental determination of the real elements of the density matrix of $H(n=3)$ atoms produced in 20-100 keV collisions of H^+ on Kr atoms," N. Seifert, N. D. Gibson, and J.S. Risley, **Physical Review A**, **52**, p. 3816, 1995.
5. "P-wave Photodetachment in a Static Electric Field," N. D. Gibson, B. J. Davies, and D. J. Larson, **Physical Review A**, **48**, No. 1, pp. 310-320, 1993.
4. "The Electron Affinity of Platinum," N. D. Gibson, B. J. Davies, and D. J. Larson, **Journal of Chemical Physics**, **98**, No. 6, pp. 5104-5105, 1993.
3. "S-wave Photodetachment in a Static Electric Field," N. D. Gibson, B. J. Davies, and D. J. Larson, **Physical Review A**, **47**, No. 3, pp. 1946-1952, 1993.
2. "Electric Field Effects in Photodetachment from Cl^- and S^- ions in a Microwave Field," M.C. Baruch, W.G. Sturru, N. D. Gibson, and D. J. Larson, **Physical Review A**, **45**, No. 5, pp. 2825-2832, 1992.
1. "Stimulated Brillouin scattering of multiline hydrogen fluoride laser radiation," M. T. Duignan, B.J. Feldman, N.D.Gibson, and W. T. Whitney, **SPIE**, **874**, pp. 25-38, 1988

PROFESSIONAL PRESENTATIONS

101. N.D. Gibson, C.W. Walter, G.R. Drumm*, Y. Li*, and S.M. Miller*, “The Electron Affinity of Thallium by Laser Photodetachment Threshold Spectroscopy”, *Poster*, ICAP, Barcelona, Spain (2018).
100. C.W. Walter, N.D. Gibson, N.B. Lyman*, J. Wang*, “Photodetachment Spectroscopy of Bound and Quasibound States of the Negative Ion of Lanthanum”, *Poster*, ICPEAC XXX – The International Conference on Photonic, Electronic, and Atomic Collisions, Cairns, Australia (2017).
99. N.D. Gibson, C.W. Walter, C.T. Crocker*, W. Nakayama*, J Wang*, and J.N. Yukich, “Infrared Photodetachment Spectroscopy Measurement of the Electron Affinity of Gallium and the Fine Structure of Ga⁻”, *Poster*, ICPEAC XXX, Cairns, Australia (2017).
98. C.W. Walter, N.D. Gibson, N.B. Lyman*, J. Wang*, “Bound and Quasibound States of the Negative Ion of Lanthanum Studied by Photodetachment Spectroscopy”, *Poster*, DAMOP – American Physical Society Division of Atomic, Molecular, and Optical Physics Meeting, Sacramento, CA (2017).
97. N.D. Gibson, C.W. Walter, C.T. Crocker*, W. Nakayama*, J Wang*, and J.N. Yukich, “Experimental Measurements of the Electron Affinity of Gallium and the Fine Structure of Ga⁻”, *Poster*, DAMOP, Sacramento, CA (2017).
96. C.W. Walter, N.D. Gibson, C. Crocker*, K.A. Dungan*, and B.R. Matola*, “Photodetachment Spectroscopy of La⁻: Resonances and Thresholds”, *Poster*, ICPEAC XXIX – The International Conference on Photonic, Electronic, and Atomic Collisions, Toledo, Spain (2015).
95. R. C. Bilodeau, N. D. Gibson, C. W. Walter, I. Dumitriu, A. Aguilar, D. Macaluso, and N. Berrah, “Inner-Shell Photodetachment from the Carbon Chain Negative Ions”, *Poster*, ICPEAC XXIX, Toledo, Spain (2015).
94. C.W. Walter, N.D. Gibson, C. Crocker*, K.A. Dungan*, and B.R. Matola*, “Photodetachment Spectroscopy of La⁻: Resonances and Thresholds”, *Poster*, DAMOP - American Physical Society Division of Atomic, Molecular, and Optical Physics Meeting, Columbus, OH (2015).
93. R. C. Bilodeau, N. D. Gibson, C. W. Walter, I. Dumitriu, A. Aguilar, D. Macaluso, and N. Berrah, “Inner-Shell Photodetachment of the Carbon Anion Chain”, *Poster*, DAMOP, Columbus, OH (2015).
92. I. Dumitriu, R. C. Bilodeau, T. W. Gorczyca, C. W. Walter, N. D. Gibson, D. Rolles, Z. D. Pešić, A. Aguilar, and N. Berrah, “Inner-Shell Photodetachment of Nickel Negative Ions”, *Poster*, DAMOP, Columbus, OH (2015).
91. “A Promising Candidate for Laser Cooling of Negative Ions: Observations of Bound-Bound Transitions in La⁻”, C.W. Walter, N. D. Gibson, D. J. Matyas*, C. Crocker*, K.A. Dungan*, B.R. Matola*, and J. Rohlén, DAMOP - American Physical Society Division of Atomic, Molecular, and Optical Physics Meeting, Madison, Wisconsin (2014).
90. “Experimental Measurements of the Electron Affinity of Gallium and the Fine Structure of Ga⁻”, N.D. Gibson, C. W. Walter, C. Crocker*, J.N. Yukich, DAMOP, Madison, Wisconsin (2014).
89. “Toward Laser Cooling of Negative Ions: Observations of Multiple Bound-Bound Transitions in the Negative Ion of Lanthanum La⁻”, C.W. Walter, N.D. Gibson, C. Crocker*, K. Dungan*, B. Matola*, M. Scharpf*, J. Rohlén, ICPEAC XXVIII – The International Conference on Photonic, Electronic, and Atomic Collisions, Lanzhou, China (2013).
88. “Measurement of the Electron Affinity of Gallium and the Fine Structure of Ga⁻ using Infrared Photodetachment Threshold Spectroscopy”, N.D. Gibson, C.W. Walter, C. Crocker*, J.N. Yukich, ICPEAC XXVIII, Lanzhou, China (2013).
87. “Measurement of the Electron Affinity of Gallium and the Fine Structure of Ga⁻”, C.W. Walter, N.D. Gibson, C. Crocker*, R. Ficken*, and J. Yukich, 44th Meeting of the Division of Atomic, Molecular and Optical Physics, Quebec City, Canada 2013.
86. Additional presentations