Scott D. Bergeson

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Education

Ph.D., University of Wisconsin (1995), Thesis advisor: Professor James E. Lawler

B.S., Brigham Young University (1990), cum laude

Appointments

Professor, Department of Physics and Astronomy, Brigham Young University (2010–present)

Co-Owner, Science-Surplus.com (2010–present)

Associate Professor, Department of Physics and Astronomy, Brigham Young University (2004–2010)

Assistant Professor, Department of Physics and Astronomy, Brigham Young University (1998–2004)

Consultant, biophotonic instrumentation development (2002–present)

NIST/NRC Postdoctoral Research Fellow, National Institute of Standards and Technology, Gaithersburg MD (1996–1998) Advisors: Dr. Thomas B. Lucatorto, Dr. Steven L. Rolston

Postdoctoral Research, University of Connecticut (1995–1996), Advisor: Professor Edward E. Eyler

Honors and Awards

Best non-student talk, APS Four Corners Meeting, Tempe, AZ, 2015

NSF/DOE Partnership in basic plasma science and engineering, "Collaborative research: Plasma physics at small Coulomb logarithms," with Los Alamos National Laboratory and Willamette University (2015-2018)

BYU College of Physical and Mathematical Science, Teaching Excellence Award (2014)

National Science Foundation, "Laser-cooling ions in an ultracold neutral plasma," (2014-2016)

Air Force Office of Scientific Research grant, "Achieving higher Γ in ultracold neutral plasmas through disorder-induced heating control," (2013-2016)

National Science Foundation grant, "Dynamics of ultracold neutral plasmas in the first 100 ns," (2010-2013)

National Science Foundation grant, "Non-equilibrium dynamics of ultracold neutral plasmas," (2006-2009)

Alexander von Humboldt research fellow, Max Planck Institute for Quantum Optics, Garching, Germany (2005-2006), Academic Host: Prof. Dr. T. W. Haensch

National Science Foundation CAREER award, "Highly excited ultracold atoms," (2000-2005)

NIST/NRC Postdoctoral Research Fellowship, National Institute of Standards and Technology, Gaithersburg MD (1996-1998)

Research interests

Ultracold neutral plasmas, strongly coupled coulomb systems, laser cooling and trapping, precision atomic spectroscopy, laser frequency combs, biophotonics instrumentation, x-ray diagnostics, precision nuclear decay measurements

Professional volunteer work

Co-Organizer of the APS Division of Plasma Physics mini-conference on the Crossover between High-Energy-Density Plasmas and Ultracold Neutral Plasmas, Portland, Oregon, November 2018

Organizer of the Wisconsin Atomic Physics Seminar in honor of Prof. J. E. Lawler, Madison, Wisconsin, April 2018

4-Corners Program Committee, American Physical Society, 2014

Program Committee, Division of Atomic, Molecular, and Optical Physics, American Physical Society, 2006–2009

Atomic Physics Topical Editor, *Journal of the Optical Society of America B*, 2000–2005.

Reviewer, *Physical Review Letters*, *Physical Review A*, *Optics Letters*, National Science Foundation, Research Corporation

Patents

"Raman instrument for measuring weak signals in the presence of strong background fluorescence," Patent number 7,558,619

Book chapters

1. M. S. Murillo and S. D. Bergeson, "Ultracold Neutral Plasmas Well into the Strongly Coupled Regime," *Advances In Atomic, Molecular, and Optical Physics*, (Academic Press, 2015), DOI:10.1016/bs.aamop.2015.04.001

Recent BYU Service

Department rank and status committee, 2010 - present

Department retreat planning committee, 2017

Strategic planning committee, 2014 - 2016

Peer-reviewed publications

56. Tucker Sprenkle, Adam Dodson, Quinton McKnight, Ross Spencer, Scott Bergeson, Abdourahmane Diaw, and Michael S. Murillo, "Ion friction at small values of the Coulomb logarithm," Submitted to Phys. Rev. E (2018)

55. Q.McKnight, S.D.Bergeson, J.Peatross, and M.J.Ware, "2.7 years of beta-decay-rate ratio measurements in a controlled environment," Applied Radiation and Isotopes 142, 113-119 (2018), DOI:10.1016/j.apradiso.2018.09.021

54. Q. McKnight, A. Dodson, T. Sprenkle, T. Bennett, and S. D. Bergeson, "Comment on 'Laser cooling of Yb-173 for isotope separation and precision hyperfine spectroscopy," Phys. Rev. A 97, 016501 (2018), DOI:10.1103/PhysRevA.97.016501

53. S. D. Bergeson, J. B. Peatross, and M. Ware, "Precision long-term measurements of beta-decay-rate ratios in a controlled environment," Phys. Lett. B 767, 171-176 (2017), DOI:10.1016/j.physletb.2017.01.030

52. Michaela Kleinert, M. E. Gold Dahl, and Scott Bergeson, "Measurement of the Yb I ${}^1S_0 - {}^1P_1$ transition frequency at 399 nm using an optical frequency comb," Phys. Rev. A 94, 052511 (2016), DOI:10.1103/PhysRevA.94.052511

51. M. Lyon, S. D. Bergeson, G. Hart, and M. S. Murillo, "Strongly-coupled plasmas formed from laser-heated solids," Scientific Reports 5, 15693 (2015), DOI:10.1038/srep15693

50. M. J. Ware, S. D. Bergeson, J. E. Ellsworth, M. Groesbeck, J. E. Hansen, D. Pace and J. Peatross, "Instrument for precision long-term β-decay rate measurements," Rev. Sci. Instrum. 86, 073505 (2015), DOI:10.1063/1.4926346

49. S. D. Bergeson, M. Lyon, J. B. Peatross, N. Harrison, D. Crunkleton, J. Wilson, S. Rupper, A. Diaw and M. S. Murillo, "A neutral strongly coupled laser-produced plasma by strong-field ionization in a gas jet," AIP Conf. Proc. 1668, 040001 (2015), December 2014, Takamatsu, Japan, DOI:10.1063/1.4923114

48. M. Lyon and S. D. Bergeson, "Towards stronger Coulomb coupling in an ultracold neutral plasma," Contrib. Plasma Phys. 55, 399-406 (2015), DOI:10.1002/ctpp.201400097

47. M. Lyon, S. D. Bergeson, A. Diaw, and M. S. Murillo, "Using higher ionization states to increase Coulomb coupling in an ultracold neutral plasma," Phys. Rev. E 91, 033101 (2015)

46. M. Lyon and S. D. Bergeson, "Precision spectroscopy using a partially stabilized frequency comb," Appl. Opt. 53, 5163-5168 (2014)

45. M. Lyon, S. D. Bergeson and M. S. Murillo, "The limit of strong ion coupling due to electron shielding," Phys. Rev. E 87, 033101 (2013)

44. J. F. Hulbert, M. Giraud-Carrier, T. Wall, A. R. Hawkins, S. D. Bergeson, J. Black, and H. Schmidt, " Versatile Rb vapor cells with long lifetimes," J. Vac. Sci. Tech. A **31**, 033001 (2013)

43. N. Heilmann, J. B. Peatross, and S. D. Bergeson, " 'Ultracold' neutral plasmas at room temperature, Phys. Rev. Lett. **109**, 035002 (2012)

42. A. J. Edmund, S. D. Bergeson, M. Lyon, N. Taylor, I. Kalinitchenko, P. B. Farnsworth, "Evaluation of Space Charge Effects in the Second Vacuum Stage of a Commercial Inductively Coupled Plasma Mass Spectrometer by Planar Laser-Induced Fluorescence Imaging," Spectrochim. Acta B **76**, 109-118 (2012)

41. S. D. Bergeson, A. Denning, M. Lyon, and F. Robicheaux "Density and temperature scaling of disorder-induced heating in ultracold plasmas," Phys. Rev. A **83** 023409 (2011)

40. M Lyon and S D Bergeson, "The influence of electron screening on disorder-induced heating," J. Phys. B: At. Mol. Opt. Phys. **44** (2011) 184014.

39. Daniel A. Thrasher, Matthew Burbidge, Miriam N. Conde, and Scott D. Bergeson "Comments on 'Intensity noise of an injection-locked Ti:sapphire laser: analysis of the phase-noise-to-amplitude-noise conversion,' " J. Opt. Soc. Am. B **28** 1553 (2011)

38. A. Denning, S. D. Bergeson, and F. Robicheaux, "Measurement and simulation of laser-induced fluorescence from nonequilibrium ultracold neutral plasmas," Phys. Rev. A **80** 033415 (2009)

37. A. Denning, A. Booth, S. Lee, M. Amonson, and S. D. Bergeson, "Comment on 'Generation of cold low divergent atomic beam of indium by laser ablation' [Rev. Sci. Instrum. 76, 113302 (2005)]," Rev. Sci. Instrum. 80, 047101 (2009)

36. S. D. Bergeson and F. Robicheaux, "Recombination fluorescence in ultracold neutral plasmas," Phys. Rev. Lett. 101, 073202 (2008)

35. S. D. Bergeson, J. B. Peatross, N. J. Eyring, J. F. Fralick, D. N. Stevenson, and S. B. Ferguson, "Resonance Raman measurements of carotenoids using light emitting diodes," Journal of Biomedical Optics 14, 0440206 (2008)

34. S. D. Bergeson, J. B. Peatross, N. J. Eyring, J. F. Fralick, and S. B. Ferguson, "Divided shifted Raman spectroscopy for carotenoid detection," Proc. SPIE 6853, 68530A (2008)

33. P. Fendel, S. D. Bergeson, and T. W. Haensch, "Two-photon frequency comb spectroscopy of the 6s-8s transition in cesium" *Optics Letters* 32, 701 - 703 (2007)

32. J. Peatross and S. D. Bergeson, "Fourier spectroscopy of ultrashort laser pulses," Am. J. Physics 74, 842 - 845 (2006)

31. N. Kolachevsky, J. Alnis, S. D. Bergeson, T. W. Haensch, "Compact solid-state laser source for 1S-2S spectroscopy in atomic hydrogen," Phys Rev. A 73, 021801 (2006)

30. T. Weeks, M. Harrison, M. Johnson, A. P. Shevelko, J. Ellsworth, S. Bergeson, M. Asplund, and L. V. Knight, "Absolute soft x-ray calibration of laser produced plasmas using a focusing crystal von Hamos spectrometer," Proc. SPIE Int. Soc. Opt. Eng. 5918, 59180R (2005)

29. E. A. Cummings, J. E. Daily, D. S. Durfee, and S. D. Bergeson, "Ultracold neutral plasma expansion in two dimensions," Phys. Plasmas 12, 123501 (2005)

28. E. A. Cummings, J. E. Daily, D. S. Durfee, and S. D. Bergeson, "Fluorescence measurement of expanding strongly-coupled neutral plasmas," Phys. Rev. Lett. 95, 235001 (2005)

27. J. E. Daily, R. Gommers, E. A. Cummings, D. S. Durfee, and S. D. Bergeson, "Two-photon photionization of the Ca 4s3d 1D2 level in an optical dipole trap," Phys. Rev. A 71, 043406 (2005)

26. R. Olson, R. Merrill, J. Paul, S. D. Bergeson, and D. S. Durfee, "Self-referencing prism deflection measurement schemes with microradian precision," Appl. Optics 44, 4639-4647 (2005)

25. Rebecca Merrill, Rebecca Olson, Scott Bergeson, and Dallin S. Durfee, "Increasing the output of a Littman-type laser by use of an intracavity Faraday rotator," Appl. Optics 43, 3910-3914 (2004)

24. T. C. Killian, V. S. Ashoka, P. Gupta, S. Laha, S. B. Nagel, C. E. Simien, S. Kulin, S. L. Rolston, and S. D. Bergeson, "Ultracold neutral plasmas: recent experiments and new prospects," J. Phys. A: Math. Gen. 36, 6077-6085 (2003)

23. S. D. Bergeson and R. L. Spencer, "Neutral plasma oscillations at zero temperature," Phys. Rev. E **67**, 026414, pp. 1-5, (2003)

22. E. A. Cummings, M. S. Hicken, and S. D Bergeson, "Demonstration of a 1-W injection-locked continuous-wave titanium:sapphire laser," Applied Optics **36**, 7583-7587 (2002)

21. A. Ludlow, H. M. Nelson, and S. D. Bergeson, "Two-photon absorption in potassium niobate," J. Opt. Soc. Am. B. **18**, 1913-1820 (2001)

20. T. C. Killian, M. J. Lim, S. Kulin, R. Dumke, S. D. Bergeson, and S.L. Rolston, "Formation of Rydberg atoms in an expanding ultracold neutral plasma," Phys. Rev. Lett. **86**, 3759-3762 (2001)

19. S. D. Bergeson, K. G. H. Baldwin, T. B. Lucatorto, T. J. McIlrath, C. H. Cheng, and E. E. Eyler, "Doppler-free two-photon spectroscopy in the VUV: the helium $1^1S - 2^1S$ transition," J. Opt. Soc. Am. B **17**, 1599-1606 (2000)

18. S. Kulin, T. C. Killian, S. D. Bergeson and S. L. Rolston, "Plasma oscillations and expansion of an ultracold neutral plasma," Phys. Rev. Lett. **85**, 318-321 (2000)

17. T. Killian, S. Kulin, S. D. Bergeson, L. Orozco, and S. L. Rolston, "Creation of an ultracold neutral plasma," Phys. Rev. Lett. **83**, 4776-4779 (1999)

16. J. E. Lawler, S. D. Bergeson, J. A. Fedchak, and K. L. Mullman, "VUV f-values of astrophysical interest from high sensitivity absorption spectroscopy on atomic ions," Physica Scripta **T83**, 11-18 (1999)

15. S. D. Bergeson, A. Balakrishnan, K. G. H. Baldwin, T. B. Lucatorto, J. P. Marangos, T. J. McIlrath, T. R. O'Brian, S. L. Rolston, C. J. Sansonetti, Jesse Wen, C. H. Cheng, and E. E. Eyler, "Precision spectroscopy in He as a test of QED," Physica Scripta **T83**, 76-82 (1999)

14. C. Orzel, S. D. Bergeson, S. Kulin, and S. L. Rolston, "Time-resolved studies of ionizing collisions," Phys. Rev. Lett. 80, 5093-5096 (1998)

13. S. D. Bergeson, A. Balakrishnan, K. G. H Baldwin, T. B. Lucatorto, J. P. Marangos, T. J. McIlrath, T. R. OBrian, S. L. Rolston, C. J. Sansonetti, Jesse Wen, N. Westbrook, C. H. Cheng, and E. E. Eyler,"Measurement of the He ground state Lamb shift via the two-photon $1^1S - 2^1S$ transition," Phys. Rev. Lett. **80**, 3475-3478 (1998)

12. J. E. Lawler, M. A. Childs, K. L. Menningen, L. W. Anderson, S. D. Bergeson, and K. L. Mullman, "UV/VUV high sensitivity absorption spectroscopy for diagnosing lighting and processing plasmas and for basic data," AIP Conf. Proc. 363, 1 (1996)

11. S. D. Bergeson, K. L. Mullman, and J. E. Lawler, "High sensitivity absorption spectroscopy in Fe II," Astrophys. J. **464**, 1050-1053 (1996)

10. S. D. Bergeson, K. L. Mullman, M. E. Wickliffe, J. E. Lawler, U.Litzen, and S. Johansson, "Branching fractions and oscillator strengths for Fe II transitions from the $3d^6(5D)4p$ subconfiguration," Astrophys. J. **464**, 1044-1049 (1996)

9. D. E. Nitz, S. D. Bergeson, and J. E. Lawler, "Radiative lifetimes in Co I," J. Opt. Soc. Am. B **12**, 377-383 (1995)

8. H. M. Anderson, S. D. Bergeson, D. Doughty, and J. E. Lawler, "Xe I 147 nm resonance f-value and trapped decay rates," Phys. Rev. A **51**, 211-217 (1995)

7. S. D. Bergeson, K. L. Mullman, and J. E. Lawler, "Oscillator Strengths for Fe II transitions at 224.918 and 226.008 nanometers," Astrophys. J. **435**, L157-L159 (1994)

6. A. G. Calamai, P. L. Smith, and S. D. Bergeson, "Transition Probabilities for the $3s^2 3p(^2P^{\rm o}) - 3s3p^2(^4P)$ intersystem lines of Si II," Astrophys. J. 415, L59-L62 (1993)

5. S. D. Bergeson and J. E. Lawler, "Oscillator strengths of the Si II 181 nanometer resonance multiplet," Astrophys. J. 414, L137-L140 (1993)

4. S. D. Bergeson and J. E. Lawler, "Radiative lifetimes, branching ratios, and absolute transition probabilities in Cr II and Zn II," Astrophys. J. 408, 382-388 (1993)

3. J. E. Lawler, S. D. Bergeson, and R. C. Wamsley, "Advanced experimental techniques for measuring oscillator strengths of vacuum ultraviolet lines," Physica Scripta T47, 29-35 (1993)

2. S. D. Bergeson and J. E. Lawler, "Radiative lifetimes in Ni I," J. Opt. Soc. Am. B 10, 794-798 (1993)

1. A. Bizzarri, M. C. E. Huber, A. Noels, N. Grevesse, S. D. Bergeson, P. Tsekeris, and J. E. Lawler, "Ti-II transition probabilities and radiative lifetimes in Ti^+ and the solar titanium abundance," Astron. Astrophys. 273, 707-718 (1993)

Non-peer-reviewed publications

7. Scott Bergeson, "Really cool neutral plasmas," Science 363, 33-34 (2019)
6. S. D. Bergeson, M. J. Ware, and J. Hawk, "On the use of NaI scintillation for high stability nuclear decay rate measurements, arXiv:1707.03392, 2017
5. S. D. Bergeson and M. Lyon, "Measurements of the ion velocity distribution in an ultracold neutral plasma derived from a cold, dense Rydberg gas," arXiv:1601.07439, 2016
4. Scott Bergeson and Thomas Killian, "Ultracold plasmas and Rydberg gases," *Physics World* February 2003 pp 37-41
3. K. A. Jensen, R. L. Larson, S. D. Bergeson, and E. F. McCormack, "Exploring feedback control using experiments in optics," http://arxiv.org/abs/physics/0106091 (6 pages)
2. P. W. Keaton et al., "A hypervelocity microparticle impacts laboratory with 100 km/s projectiles," Int. J. Impact Engng. 10, 295-308 (1990)
1. G. L. Stradling et al, "Searching for momentum enhancement in hypervelocity impacts," Int. J. Impact Engng. 10, 555-570 (1990)

Invited talks

31. "Ultracold neutral plasmas as high-energy-density plasma simulators," APS Division of Plasma Physics Miniconference on the Crossover Between High-Energy-Density Plasmas and Ultracold Neutral Plasmas, Portland, OR, November 2018
30. "High energy density plasma simulations using ultracold neutral plasmas," Wisconsin Atomic Physics Seminar, Madison, Wisconsin, April 2018
29. "Dense plasma physics on the tabletop at 1 Kelvin," Utah State University, Department of Physics colloquium, November 2017
28. "Some thoughts on energy relaxation in an ultracold neutral plasma – expanding and trapped dual-species plasmas," University of British Columbia Chemical, Plasma and AMO Physics Seminar, Vancouver, BC, Canada, July 2017
27. "Can you measure a Coulomb logarithm in an ion trap?" NIST Ion Storage Group Seminar, Boulder, CO, July 2017
26. "Exploring high-energy-density physics with ultracold plasmas," Seminar über Quanten-, Atom-, und Neutronenphysik (QUANTUM), Institut für Physik, Johannes Gutenberg-Universität, Mainz, Germany, November 2016
25. "Stability measurements of nuclear decay rte ratios in a tightly controlled environment," NIST Radioactivity Group Seminar, Gaithersburg, MD, October 2016
24. "Some progress towards an ultracold Ca/Yb plasma," 2016 Air Force Office of Scientific Research Workshop (AFOSR), Santa Fe, NM, May 2016

23. “What 1-Kelvin plasmas can tell you about thermonuclear fusion,” APS 4-Corners, Tempe, AZ, October 2015

22. “Comments and perspectives on mixed-species ultracold neutral plasmas,” AFOSR BRI, Fort Collins, CO, May 2015

21. “Boosting the strong coupling parameter in neutral plasmas,” 11th International Workshop on Non-neutral Plasmas, Takamatsu, Japan, December 2014

20. “How Rydberg interactions influence neutral plasma expansion,” 2nd International Workshop on Ultracold Rydberg Physics, Recife, Brazil, October 2014

19. “Fusion Physics at 1K,” Idaho State University, Physics Department Seminar, January 2014

18. “Fusion Physics at 1K,” Brigham Young University, Department of Physics and Astronomy Colloquium, November 2013

17. “The 2012 Nobel Prize in Physics,” Utah Valley University Physics Department Colloquium, February 2013

16. “The 2012 Nobel Prize in Physics,” Brigham Young University, Department of Physics and Astronomy Colloquium, January 2013

15. “Creating order in a disordered system: strongly-coupled ultracold plasmas,” University of Utah Physics and Astronomy Colloquium, November 2012

14. “Achieving higher Γ in ultracold neutral plasmas,” AFOSR Program Review, September 2012, Arlington, VA, USA

13. “High energy density plasma physics at 0.001K,” Utah Valley University Physics Department Colloquium, April 2011

12. “Early time ion dynamics and Rabi oscillation measurements in ultracold plasmas,” Cold Rydberg Gases and Ultracold Plasmas, MPIPKS-ITAMP Tandem Workshop, September 2010, Dresden, Germany

11. “Ultracold neutral plasmas and other things that don’t go together,” Old Dominion University, Physics Department Colloquium, February 2009

10. “Ultracold plasmas and other oxymorons,” Idaho State University, Physics Department Seminar, October 2007

9. “Frequency combs in astronomy,” Optical Frequency Combs for Space, European Space Agency (ESA), National Physical Laboratory, Middlesex, Great Britain, October 2006

8. “Nearly two-dimensional ultracold plasmas,” Cold and Ultracold Plasma and Rydberg Physics Workshop, Institute for Theoretical Atomic and Molecular Physics (ITAMP), Cambridge, MA September 2005

7. “Fluorescence studies of strongly-coupled neutral Coulomb systems,” Haensch group Ringberg Seminar, Max Planck Institute for Quantum Optics, Ringberg, Germany, September 2005

6. “Fluorescence studies of ultracold plasmas,” DAMOP (APS), Lincoln, NE, May 2005

5. “Nobel Prize in Physics 2004,” Colloquium, Department of Physics and Astronomy, BYU, November 2004

4. “Ultracold neutral plasmas: too good to be true,” Colloquium, Physics Department, Utah Valley State College, March (2004)

3. “When cold, dense gases become ionized,” Colloquium, Department of Physics and Astronomy, BYU, September 2002

2. “Opportunities in cool physics with cold atoms,” Research Seminar, MOXTEK Inc., Orem, Utah, January 2002

1. “Precision spectroscopy in He as a test of QED,” 6th International Colloquium on Atomic Spectra and Oscillator Strengths, Victoria, B.C., Canada, August 1998

Contributed conference presentations

87. T. Sprenkle, R. Spencer, and S. D. Bergeson, "Ion friction in dual species ultracold plasma expansion," APS DAMOP, Fort Lauderdale, FL, June 2018

86. R. T. Sprenkle and S. D. Bergeson, "Energy relaxation in a Ca/Yb dual-species ultracold neutral plasma," APS DPP, Portland, OR, November 2018

85. T. Bennett, S. Hill, R. T. Sprenkle, and S. D. Bergeson, "A dual-species hybrid MOT/Paul trap," APS DPP, Portland, OR, November 2018

84. Tucker Sprenkle, Adam Dodson, Quin McKnight, and Scott Bergeson, " Equilibration rates in a dual-species ultracold neutral Ca/Yb plasma," APS DPP, Milwaukee, WI, October 2017

83. Tucker Sprenkle, Adam Dodson, and Scott Bergeson, "Temperature measurements in a Yb/Ca dual-species ultracold neutral plasma," APS DAMOP, Sacramento, CA, June 2017

82. Quinton McKnight, Michaela Kleinert, and Scott Bergeson, "Frequency-comb based spectroscopy of the Yb I 399 nm transition," APS DAMOP, Sacramento, CA, June 2017

81. Adam Dodson, Quinton McKnight, Tucker Sprenkle, and Scott Bergeson, "Ultracold neutral plasma heating due to resonance excitation," APS DAMOP, Sacramento, CA, June 2017

80. Stephen Rupper and Scott Bergeson, "Laser-cooling calcium ions in an ultracold neutral plasma," APS DPP, San Jose, CA, November 2016

79. Michaela Kleinert and Scott Bergeson, "Progress towards energy relaxation studies in an ultracold dual-species Yb/Ca plasma," APS DPP, San Jose, CA, November 2016

78. S. D. Bergeson and M. Lyon, "Measurements of the ion velocity distribution in an ul- tracold neutral plasma derived from a cold, dense Rydberg gas," APS DAMOP, Providence, RI, May 2016

77. Kade Bishop and S. D. Bergeson, "A first look at laser-cooling ions in an ultracold neutral plasma," APS 4-Corners, Tempe, AZ, October 2015

76. D. Crunkleton, S. D. Bergeson, J. Ellsworth, M. Gold Dahl, C. Running, "Design and characterization of a simple integrator feedback control lockbox," APS 4-Corners, Tempe, AZ, October 2015

75. M. E. Gold Dahl and S. D. Bergeson, "Characterization of a partially-stabilized frequency comb," APS 4-Corners, Tempe, AZ, October 2015

74. M. D. Gold Dahl, A. Erikson, D. Woodbury, and S. D. Bergeson, "Characterization of a partially-stabilized frequency comb," APS DAMOP, Columbus, OH, June 2015

73. D. Woodbury, A. Erikson, and S. D. Bergeson, "Dual-species ultracold neutral plasma," APS DAMOP, Columbus, OH, June 2015

72. D. Crunkleton, K. Schneider, K. Bishop, and S. D. Bergeson, "Laser-cooling ions in an ultracold neutral plasma," APS DAMOP, Columbus, OH, June 2015

71. M. Lyon and S. D. Bergeson, "Towards stronger Coulomb coupling in an ultracold neutral plasma," Strongly Coupled Coulomb Systems, Santa Fe, NM, August 2014

70. N. Harrison, D. Crunkleton, J. Peatross, and S. D. Bergeson, "Characterization of an expanding plasma generated in laser-ionized helium," APS 4 Corners sectional meeting, Orem, UT, October 17, 2014

69. D. Woodbury, S. Bergeson, and A. Erikson, "Dual species magneto optical trap for the study of ultracold plasma," APS 4 Corners sectional meeting, Orem, UT, October 17, 2014

68. Mary Lyon and Scott Bergeson, "Increasing the Coulomb coupling of an ultracold neutral plasma," APS 4 Corners sectional meeting, Orem, UT, October 17, 2014

67. E. Hansen, J. Peatross, S. Bergeson, and M. Ware, "Precision measurements of beta-decay rates," APS 4 Corners sectional meeting, Orem, UT, October 17, 2014

66. M. Lyon and S. Bergeson, "Early time dynamics of strongly coupled ultracold neutral Ca^{+} and Ca^{2+} plasmas," APS DAMOP, Madison, WI, June 2-6, 2014

65. S. Bergeson, M. Lyon, and M. Murillo, "Limit of strong ion coupling due to electron shielding," APS DPP, Denver, CO, November 2013

64. M. Lyon and S. Bergeson, "Electron screening slows ion thermalization in strongly coupled plasmas," APS DPP, Denver, CO, November 2013

63. M. Lyon and S. Bergeson, "The quest for greater strong coupling in ultracold neutral plasmas," APS 4-Corners Sectional Meeting, Boulder, CO, October 2013

62. M. Lyon and S. Bergeson, "Quadrupling the strong coupling in ultracold neutral plasmas," APS DAMOP, Quebec City, Quebec, Canada, June 2013

61. M. Lyon and S. Bergeson, "Minimizing the effects of disorder-induced heating through electron screening in ultracold plasmas," APS DAMOP, Anaheim, CA, June 2012

60. J. Wilson, S. Rupper, D. Thrasher, N. Heilmann, and S. D. Bergeson, "Ultracold neutral plasmas at room temperature," APS DAMOP, Anaheim, CA, June 2012

59. N. Rock, A. Wilkins, M. Lyon, and S. D. Bergeson, "Achieving higher Gamma plasmas using higher ionization states," APS DAMOP, Anaheim, CA, June 2012

58. M. Lyon, S. D. Bergeson, and F. Robicheaux, "Disorder-induced heating and early time dynamics in ultracold neutral plasmas," APS DAMOP, Atlanta, GA, June 2011

57. M. Lyon and S. D. Bergeson, "Electron screening and disorder-induced heating in ultracold neutral plasmas," DPP Annual Meeting, Nov 2011, Salt Lake City, UT

56. M. Lyon and S. D. Bergeson, "Electron screening and disorder-induced heating in ultracold neutral plasmas," APS Four Corners Meeting, Tucson, AZ, Oct 2011

55. A. Edmund, P. B. Farnsworth, S. D. Bergeson, N. Taylor, and M. Lyon, "Evaluation of Space Charge Effects in the Second Vacuum Stage of a Commercial ICP-MS by Planar Laser-Induced Fluorescence Imaging," FACSS Oct 2011, Reno, NV

54. Joshua Olson, J. Peatross, and S. D. Bergeson, "Measurement of Plasma Density in an Ionizing Laser Focus," OSA Frontiers in Optics, October 2011, San Jose, CA

53. Abigail Wilkins and S. D. Bergeson, "Using Space-Charge Fields to Measure Plasma Density," OSA Frontiers in Optics, October 2011, San Jose, CA

52. Dan Thrasher and S. D. Bergeson, "Amplitude and Frequency Noise of an Injection-Locked Ti:Sapphire Laser System," OSA Frontiers in Optics, October 2011, San Jose, CA

51. N. Heilmann, J. B. Peatross, and S. D. Bergeson, "Electron-ion recombination in laser-produced plasmas using optical interferometry," 53rd Annual Meeting of the APS Division of Plasma Physics November, 2011, Salt Lake City, Utah

50. S. D. Bergeson and F. Robicheaux, "Density scaling of disorder-induced heating in ultracold neutral plasmas," 41st Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, May, 2010, Houston, Texas

49. S. D. Bergeson and F. Robicheaux, "Calculations and measurements of laser-induced fluorescence in ultracold neutral plasma," 40th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, May, 2009, Charlottesville, Virginia

48. Bryce Allred, Jeff Kemp, Jershon Lopez, Larry Knight, Scott Bergeson, and Alexander Shevelko, "EUV Spectrometers for source development, characterization and optimization," 2008 Joint Fall Meeting of the Texas and Four Corners Sections of APS, AAPT, and Zones 13 and 16 of SPS, and the Societies of Hispanic & Black Physicists, El Paso, Texas, October 2008

47. Scott Bergeson, Bryce Allred, Jershon Lopez, Jeffrey Kemp, Larry Knight, and Alexander Shevelko, "EUV spectrometers for source development, characterization, and optimization" 2008 International EUVL Symposium (Semataech) Lake Tahoe, CA, USA, September 2008

46. S. Bergeson, N. Grey, M. Harrison, L. Knight, O. Yakushev and A. Shevelko, "EUV Transmission Grating Spectrometer for Absolute Intensity Measurements from 2 to 250 nm" 2008 International Workshop on EUV Lithography, Maui, Hawaii, USA, June 9-11, 2008

45. S. D. Bergeson and F. Robicheaux, "Saturation of recombination fluorescence in ultracold neutral plasmas," DAMOP (APS) Penn State, PA, USA, May 2008.

44. A. Denning and S. D. Bergeson, "Early Time Dyanmics of Ultracold Neutral Plasmas," DAMOP (APS) Penn State, PA, USA, May 2008.

43. S. D. Bergeson, J. B. Peatross, N. J. Eyring, J. F. Fralick, and S. B. Ferguson, "Divided shifted Raman spectroscopy for carotenoid detection," SPIE BIOS 2008, San Jose, California, January 2008, Proc. SPIE 6853 68530A (2008)

42. Scott Bergeson and Francis Robicheaux, "Recombination fluorescence in ultracold plasmas," DAMOP (APS), Calgary, Canada, June 5-9, 2007

41. Adam Denning and Scott Bergeson, "Electron screening and ion temperature equilibration in ultracold plasmas," DAMOP (APS), Calgary, Canada, June 5-9, 2007

40. William Farmer, Michael Amonson, and Scott Bergeson, "A dual-stage laser ablation source for cold atoms?" DAMOP (APS), Calgary, Canada, June 5-9, 2007

39. T. Weeks, M. Johnson, M. Harrison, A. Shevelko, P Lebedev, S. Bergeson, M. Asplund, and L. Knight, "Absolute Soft X-Ray Calibration of Laser Produced Plasma Using a Focusing Crystal von Hamos Spectrometer," 50th Annual Meeting of the SPIE, Optics and Photonics, San Diego, CA, August 2005

38. M. Harrison, T. Weeks, M. Johnson, A. Shevelko, J. Ellsworth, M. Asplund, S. Bergeson, and L. Knight, "Using a Conical von Spectrometer to Monitor X-ray Emission form Laser Produced Plasmas," Fall 2005 Meeting of the Four Corners Section for the American Physical Society (APS), Boulder, CO, October, 2005.

37. B. Neyenhuis, R. Tang, S. Bergeson, and D. Durfee, "Progress Towards a Hz Stable 657 nm Diode Laser," Annual Meeting of the Optical Society of America, Symposium on Undergraduate Research (OSA/APS Laser Science XXI), Tucson, AZ, October, 2005

36. R. Tang, B. Neyenhuis, S. Bergeson, and D. Durfee, "An External Cavity Diods Laser with as Intracavity Faraday Isolator," Annual Meeting of the Optical Society of America, Symposium on Undergraduate Research (OSA/APS Laser Science XXI), Tucson, AZ, October, 2005

35. Christopher Erickson, Dallin Durfee, and Scott Bergeson, "High Temperature Calcium Vapor Cell for Absorption Spectroscopy on the Intercombination Line," DAMOP (APS), Lincoln, NE, May 1721 (2005)

34. Chris Erickson, Brian Neyenhuis, Justin Paul, Greg Doermann, Scott Bergeson, Dallin Durfee, "Design and Construction of a Ca/Sr Atom Interferometer," DAMOP (APS), Lincoln, NE, May 1721 (2005)

33. Jared Daily, Ralf Gommers, Elizabeth Cummings, Dallin Durfee, Scott Bergeson, "Two-photon photo-ionization of the Ca $4s3d\ ^1D_2$ level in an optical dipole trap," DAMOP (APS), Lincoln, NE, May 1721 (2005)

32. Jay Eyring, Justin Peatross, and Scott Bergeson, "How to screw up your relative intensity measurement," DAMOP (APS), Lincoln, NE, May 1721 (2005)

31. Tyler Weeks, Mike Johnson, Matt Harrison, Scott Bergeson, Alexander Shevelko, "Absolute soft x-ray calibration of laser produced plasmas using a focusing crystal von Hamos spectrometer," DAMOP (APS), Lincoln, NE, May 1721 (2005)

30. E. Cummings, J. Daily, D. Durfee, and S. D. Bergeson, "Optical detection of ultracold neutral calcium plasmas," DAMOP (APS), Tucson, AZ, May 25-29 (2004), Bull. Am. Phys. Soc., Vol. 49, No. 3, p. 50, May, 2004

29. J. Daily, E. Cummings, D. Durfee, and S. D. Bergeson, "1-dimensional calcium FORT", DAMOP (APS), Tucson, AZ, May 25-29 (2004), Bull. Am. Phys. Soc., Vol. 49, No. 3, p. 59, May, 2004

28. C. Erickson, R. Olson, B. Neyenhuis, S. D. Bergeson, and D. Durfee, "Progress towards a diode laser resonant with the 657 nm calcium inercombination line with Hertz-level stability," DAMOP (APS), Tucson, AZ, May 25-29 (2004), Bull. Am. Phys. Soc., Vol. 49, No. 3, p. 112, May 2004

27. D. Durfee, R. Merrill, R. Olson, S. D. Bergeson, "Improving the output of a Littman-Metcalf diode laser using an intra-cavity Faraday-effect isolator," DAMOP (APS), Tucson, AZ, May 25-29 (2004), Bull. Am. Phys. Soc., Vol. 49, No. 3, p. 133, May, 2004

26. R. Merrill, R. Olson, D. Durfee, and S. Bergeson, "A new scheme for diode laser stabilization," DAMOP (APS), Boulder, CO, May 21-24 (2003)

25. J. Hart, R. Spencer, D. Durfee, and S. Bergeson, "Electron Temperatures in Ultracold Plasmas," DAMOP (APS), Boulder, CO, May 21-24 (2003)

24. B. McLaughlin, J. Daily, D. Durfee, and S. Bergeson, "How to build your own green laser," DAMOP (APS), Boulder, CO, May 21-24 (2003)

23. R. Merrill, R. Olson, D. Durfee, S. Bergeson, "A new scheme for external-cavity diode laser stabilization," APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

22. M. Cannon, N. Eyring, S. Bergeson, and D. Durfee, "Current driver and optical coatings for frequency-stabilized laser diodes," APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

21. B. McLaughlin, J. Daily, S. Bergeson and D. Durfee, "A high power diode pumped cw green laser," APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

20. B. Cummings, J. Hopper, D. Durfee, and S. Bergeson, "Absorptive imaging of laser-cooled calcium atoms " APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

19. J. Hart, S. Bergeson, and R. Spencer, "Simulations of ultracold plasmas," APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

18. Z. Yasin, R. Spencer, and S. Bergeson, "Modeling of ultracold plasma expansion," APS 4-Corners Meeting, Salt Lake City, UT, October 4-5 (2002)

17. E. A. Cummings, M. S. Hicken, and S. D. Bergeson, "A 1 Watt indection-seeded ti:sapphire laser," DAMOP (APS), Williamsburg, VA, May 29-June 1 (2002)

16. A. Ludlow, H. M. Nelson, and S. D. Bergeson, "Two-photon absorption in potassium niobate," OSA Annual Meeting, Long Beach, CA, October 14-18 (2001)

15. S. D. Bergeson, "Progress towards cold, dense calcium plasmas," OSA Annual Meeting, Long Beach, CA, October 14-18 (2001)

14. K. A. Jensen, R. J. Larson, S. D. Bergeson, "Feedback control of a laser pointing device," OSA Annual Meeting, Long Beach, CA, October 14-18 (2001)

13. S. D. Bergeson, A. Ludlow, and AH. M. Nelson, "Thermal self-locking in cw second harmonic generation," OSA Annual Meeting, Providence, RI, October 22-26 (2000)

12. S. D. Bergeson and H. Mark Nelson, "Ultracold calcium plasmas," OSA Annual Meeting, Providence, RI, October 22-26 (2000)

11. S. Bergeson, "500 nK in calcium: improving the optical frequency standard," DAMOP (APS), Storrs, CT, June 14-17 (2000)

10. S. D. Bergeson, "Experiments in highly excited ultracold calcium," Gordon Conference on Atomic Physics, Plymouth, NH, July 4-9, 1999

9. S. Bergeson, S. Kulin, C. Orzel, and S. Rolston, "An ultracold strongly coupled neutral plasma,"APS 4-Corners Meeting, Provo, UT, October 16-17 (1998)

8. S. Bergeson, S. Kulin, C. Orzel, S. Rolston, "An ultracold strongly coupled neutral plasma," OSA annual meeting, Baltimore, MD, October 4-9 (1998)

7. Scott Bergeson, "Ultra-cold Plasma Physics at NIST," Fifth Annual Sigma Xi Postdoctoral Poster Presentations, NIST, Gaithersburg, MD, February (1998)

6. Scott D. Bergeson, Jesse Wen, and Thomas B. Lucatorto, "Doppler-free resonance ionization spectroscopy of the He $1s^2\ ^1S - 1s2s\ ^1S$ transition at 120.3 nm," Fourth Annual Sigma Xi Postdoctoral Poster Presentations, NIST, Gaithersburg, MD, February (1997)

5. S. D. Bergeson, A. Balakrishnan, K. G. H. Baldwin, T. B. Lucatorto, J. P. Marangos, T. J. McIlrath, T. R. O'Brian, S. L. Rolston, and N. Vansteenkiste, "Doppler-free resonance ionization spectroscopy of the He $1s^2\ ^1S - 1s2s\ ^1S$ transition at 120.3 nm," Eighth international symposium on Resonance Ionization Spectroscopy, AIP Conference Proceedings 338, June 30 - Juluy 5 (1996)

4. S. D. Bergeson, H. Anderson, D. A. Doughty, and J. E. Lawler, "Measurement of the XeI 147 nm Resonance f-value," 47th Annual Gaseous Electronics Conference, Gaithersburg, Maryland, October 17-21 (1994)

3. J. E. Lawler, H. Anderson, S. D. Bergeson, and D. A. Doughty, "Radiation Trapping Simulations for the XeI 147 nm Resonance Line," 47th Annual Gaseous Electronics Conference, Gaithersburg, Maryland, October 17-21 (1994)

2. S. D. Bergeson and J. E. Lawler, "Advanced experimental techniques for measuring oscillator strengths of ultraviolet and vacuum ultraviolet transitions," ICAP 14, Boulder, CO, July 31 – August 5 (1994)

1. S. D. Bergeson and J. E. Lawler, "Oscillator Strengths of the Si II 181 nanometer Resonance Multiplet," 183rd Meeting of the American Astronomical Society, Washington, D. C., January (1994) [See also BAPS 25, No. 4, January 1994]

Plus a few dozen presentations at the Brigham Young University Annual Spring Research Conference

Student Mentoring

Undergraduate Students

Michael Amonson, Joel Allred, Bryce Allred, Aaron Astle, Levi Barnes, Tyler Bennett, Virginia Billings, Kade Bishop, Alex Booth, Peter Bradford, LeAnn Brown, Matt Cannon, Miriam Conde, Daniel Crunkleton, Beth Cummings, Jared Daily, Adam Dodson, Chris Erickson, Alex Erikson, N. Jay Eyring, William Farmer, Daniel Farrell, Meredith Gold Dahl, Brian Hansen, Matthew Harrison, James Hart, Sarah Hill, Joe Hopper, Katie Jenson, Jeff Kemp, Robert Larson, Sheng Lee, Chanelle Lockard, Jershon Lopez, Andrew Ludlow, Angela Johnson Mains, Robert McClellan, Quinton McKnight, Bonnie McLaughlin, Rebecca Merrill, Nathan Moody, Brian Neyenhuis, Joshua Olson, Rebecca Olson, Colter Paulson, Michael Peterson, Nathan Rock, Steven Rupper, Kyle Sneider, Jared Smith, Richard Sandberg, Jared Smith, Daniel Thrasher, George Walker, Tyler Weeks, Eva Wilcox, Rosie Wilcox, Abigail Wilkins, Claira Wilson, Joshua Wilson, Daniel Woodbury (61 students)

Graduate Students

Beth Cummings, Jared Daily, Adam Denning, Nathan Heilmann, Malcolm Hicken, Mary Lyon, Robert Tucker Sprenkle, Ribekah Takahashi, Zafar Yasin (9 students)

RET – High School Teachers

Don Bastian, Duane Bickmore, John Bromley, Lisa Covert, Thomas Erekson, Lars Johnson, Mack Harden, Brad Talbert (8 teachers)

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5. 2009 University of Nevada–Reno $13,521
4. 2006 National Science Foundation $421,625
3. 2004 Moxtex Laser Gift-in-Kind $110,000
2. 2000 National Science Foundation CAREER award $525,311
1. 1999 Research Innovations grant from the Research Corporation, $34,900