David Sumner Hall

Department of Physics
Amherst College
Amherst, MA 01002–5000
Tel. (413) 542-2072; (413) 542-5821 (FAX)
dshall@amherst.edu

Education

Ph.D., Physics, Harvard University, November 1997. Thesis: *Positrons, Antiprotons, and Interactions for Cold Antihydrogen* (Gerald Gabrielse, advisor).

A.M., Physics, Harvard University, May 1994.

A.B. *summa cum laude*, Physics, Amherst College, May 1991. Honors thesis: *Three-Photon Decay of Orthopositronium and a Possible Application to Bell's Theorem* (Kannan Jagannathan, advisor).

Honors and Awards

PI, National Science Foundation Grant PHY–0855475, 2009–2012, *Experiments with Bose-Einstein Condensates.*

Co-PI, National Science Foundation Grant DMS–0806762, 2008–2010, *Modeling, Analysis, Computation and Experiments of Two-Component Bose-Einstein Condensates.*

PI, National Science Foundation Grant PHY–0457402, 2005–2008, *Bose-Einstein Condensates with Vortices and Tunable Interactions.*

Max and Etta Lazerowitz Lectureship (Amherst College), 2004.

Trustee Faculty Fellowship (Amherst College), 2002–2003.

PI, National Science Foundation Grant PHY–0140207, 2002–2005, *Binary Bose-Einstein Condensates near a Feshbach Resonance.*

Cottrell College Science Award, Research Corporation, 2002–2004, *Tunable Interactions in a Rb-87 Bose-Einstein Condensate.*

Faculty Research Award (Amherst College), 2001, *Binary Bose-Einstein Condensates near a Feshbach Resonance.*

Amherst College Fellowship, 1991–1992.

Sigma Xi (national scientific honor society), May 1991.

William Warren Stifler Physics Prize (Amherst College), May 1991.

Phi Beta Kappa (national honor society), May 1990.

Bassett Physics Prize (Amherst College), May 1989.

Appointments

Associate Professor of Physics, Amherst College, 2006–present.

Assistant Professor of Physics, Amherst College, 1999–2006.

Postdoctoral Research Associate, JILA and the University of Colorado, 1997–1999.
Eric Cornell and Carl Wieman, advisors.

Teaching Assistant, Physics, University of Colorado, 1998.

Graduate Research Assistant, Harvard University, 1992–1997.
Gerald Gabrielse, advisor.

Teaching Fellow, Physics, Harvard University, 1991–1992.
Eric Mazur, Michael Aziz, and William Paul, supervisors.

Chief Engineer, WAMH-FM, 1990–1991.

Laboratory Assistant, Physics, Amherst College, 1989.

Teaching Assistant, Physics, Amherst College, 1989–1991.

Editorial Assistant, American Journal of Physics, 1988–1989.

Professional Society Membership

American Association of University Professors, 1999–present.
American Association of Physics Teachers, 1998–present.
American Association for the Advancement of Science, 1997–present.
American Physical Society, 1995–present.
Sigma Xi, 1991–present.
Phi Beta Kappa, 1990–present.

Certification and Other Education

School of Physics "Enrico Fermi," Course CXL: "Bose-Einstein Condensation," Varenna, Italy, July 1998.

Radiation Protection for the Use of Radionuclides in Research, Harvard University, February 1995.

Professional Service

Textbook Reviewer (Secondary Science), Holt, Rinehart, and Winston, 2003–2005.
Grant Reviewer, National Science Foundation, 2002–present.
Referee, American Journal of Physics, 1999–present.
Referee, Physical Review Letters, 1998–present.

Refereed Publications

K. M. Mertes, J. W. Merrill, R. Carretero-González, D. J. Frantzeskakis, P. G. Kevrekidis, and D. S. Hall, "Nonequilibrium Dynamics and Superfluid Ring Excitations in Binary Bose-Einstein Condensates," Physical Review Letters **99**, 190402 (2007).

M. H. Wheeler, K. M. Mertes, J. D. Erwin, and D. S. Hall, "Spontaneous Macroscopic Spin Polarization in Independent Spinor Bose-Einstein Condensates," Physical Review Letters **93**, 170402 (2004).

D. S. Hall, "Triggerable GPIB Controller," Review of Scientific Instruments **75**, 562 (2004).

S. F. Owen and D. S. Hall, "Fast Line-Based Timing System for LabVIEW," Review of Scientific Instruments **75**, 259 (2004).

D. S. Hall, "Resource Letter BEC-1: Bose-Einstein Condensates in Trapped Dilute Gases," American Journal of Physics **71**, 649 (2003).

M. R. Matthews, B. P. Anderson, P. C. Haljan, D. S. Hall, M. J. Holland, J. E. Williams, C. E. Wieman, and E. A. Cornell, "Watching a Superfluid Untwist Itself: Recurrence of Rabi Oscillations in a Bose-Einstein Condensate," Physical Review Letters **83**, 3358 (1999).

M. R. Matthews, B. P. Anderson, P. C. Haljan, D. S. Hall, C. E. Wieman, and E. A. Cornell, "Vortices in a Bose-Einstein Condensate," Physical Review Letters **83**, 2498 (1999).

G. Gabrielse, D. S. Hall, T. Roach, P. Yesley, A. Khabbaz, J. Estrada, C. Heimann, and H. Kalinowsky, "The Ingredients of Cold Antihydrogen: Simultaneous Confinement of Antiprotons and Positrons at 4 K," Physics Letters B **455**, 311 (1999).

G. Gabrielse, A. Khabbaz, D. S. Hall, C. Heimann, H. Kalinowsky, and W. Jhe, "Precision Mass Spectroscopy of the Antiproton and Proton Using Simultaneously Trapped Particles," Physical Review Letters **82**, 3198 (1999).

D. S. Hall, M. R. Matthews, C. E. Wieman, and E. A. Cornell, "Measurements of Relative Phase in Two-Component Bose-Einstein Condensates," Physical Review Letters **81**, 1543 (1998).

D. S. Hall, M. R. Matthews, J. R. Ensher, C. E. Wieman, and E. A. Cornell, "Dynamics of Component Separation in a Binary Mixture of Bose-Einstein Condensates," Physical Review Letters **81**, 1539 (1998).

M. R. Matthews, D. S. Hall, D. S. Jin, J. R. Ensher, E. A. Cornell, C. E. Wieman, F. Dalfovo, C. Minniti, and S. Stringari, "Dynamical Response of a Bose-Einstein Condensate to a Discontinuous Change in Internal State," Physical Review Letters **81**, 243 (1998).

D. S. Hall and G. Gabrielse, "Electron Cooling of Protons in a Nested Penning Trap," Physical Review Letters **77**, 1962 (1996).

Other Publications

D. S. Hall, "Multi-Component Condensates: Experiment," in *Emergent Nonlinear Phenomena in Bose-Einstein Condensates*, edited by P. G. Kevrekidis, D. J. Frantzeskakis, and R. Carretero-González, (New York: Springer), 307 (2008).

D. S. Hall, "Measurements of the Relative Phase Between Two Bose-Einstein Condensates" and "Intertwined Bose-Einstein Condensates," in *Bose-Einstein Condensates and Atom Lasers — Proceedings of the 27th Course of the International School of Quantum Electronics on Bose-Einstein Condensates and Atom Lasers*, edited by S. Martellucci, A. N. Chester, A. Aspect, and M. Inguscio, (New York: Kluwer Academic/Plenum Publishers), 31 (2000).

D. S. Hall, M. R. Matthews, C. E. Wieman, and E. A. Cornell, "Measurements of Relative Phase and Quantum Beat Note between Bose-Einstein Condensates," in *Quantum Coherence and Decoherence - ISQM - Tokyo '98*, edited by Y. A. Ono and K. Fujikawa, (New York: Elsevier Science B.V.), 123 (1999).

G. Gabrielse, A. Khabbaz, D. S. Hall, C. Heimann, H. Kalinowsky, and W. Jhe, "Testing CPT with Precision Mass Spectroscopy of the Antiproton and Proton," in *Proceedings of the Meeting on CPT and Lorentz Symmetry*, edited by V. A. Kostelecky, (Singapore: World Scientific), 94 (1999).

E. A. Cornell, D. S. Hall, M. R. Matthews, and C. E. Wieman, "Having it Both Ways: Distinguishable Yet Phase-Coherent Mixtures of Bose-Einstein Condensates," Journal of Low Temperature Physics **113**, 151 (1998).

D. S. Hall, J. R. Ensher, D. S. Jin, M. R. Matthews, C. E. Wieman, and E. A. Cornell,"Recent Experiments with Bose-Condensed Gases at JILA," Proceedings of the SPIE **3270**, 98 (1998).

G. Gabrielse, D. S. Hall, A. Khabbaz, T. Roach, P. Yesley, C. Heimann, H. Kalinowsky, W. Jhe, and B. Brown, "Comparing the Antiproton and Proton and Progress toward Cold Antihydrogen," in *Atomic Physics 15 – Fifteenth International Conference on Atomic Physics, Zeeman-Effect Centenary*, edited by H. B. van Linden van den Heuvell, J. T. M. Walraven, and M. W. Reynolds (Singapore: World Scientific), 446 (1997).

B. Brown, G. Gabrielse, D. S. Hall, C. Heimann, W. Jhe, H. Kalinowsky, A. Khabbaz, T. Roach, and P. Yesley, "Comparing the Antiproton and Proton and Progress toward Cold Antihydrogen," Nuclear Physics B (Proc. Suppl.) **56A**, 326 (1997).

W. Quint, R. Kaiser, D. Hall, and G. Gabrielse, "(Anti)hydrogen Recombination Studies in a Nested Penning Trap," Hyperfine Interactions **76**, 181 (1993).

Invited Presentations

D. S. Hall, "Tunable Interatomic Interactions 1-2-3," Physics Department Colloquium, Williams College, October 2009.

D. S. Hall, "Pseudospinor Bose-Einstein Condensates," Physics Seminar, Clark University, October 2007.

D. S. Hall, "Binary Bose-Einstein Condensates," Physics Seminar, Smith College, April 2006.

D. S. Hall, "Spontaneous Macroscopic Spin Polarization in Independent Spinor Bose-Einstein Condensates," Physics Seminar, University of Massachusetts, April 2005.

D. S. Hall, "Spontaneous Macroscopic Spin Polarization in Independent Spinor Bose-Einstein Condensates," Atomic Physics Seminar, NIST (Gaithersburg), April 2005.

D. S. Hall, "Spontaneous Macroscopic Spin Polarization in Independent Spinor Bose-Einstein Condensates," Atomic Physics Seminar, University of Maryland, April 2005.

D. S. Hall, "Spontaneous Macroscopic Spin Polarization in Independent Spinor Bose-Einstein Condensates," Seminar, Harvard–MIT Center for Ultracold Atoms, October 2004.

D. S. Hall, "Bose, Einstein, and the Coldest Stuff in the Universe," Lazerowitz Lecture, Amherst College, April 2004.

D. S. Hall, "Interference between Independent Bose-Einstein Condensates," Physics Department Colloquium, Swarthmore College, March 2004.

D. S. Hall, "Interference between Independent Bose-Einstein Condensates," Mathematics Department Seminar, University of Massachusetts, March 2004.

D. S. Hall, "Birth and Death of a Bose-Einstein Condensate," Physics Department Colloquium, College of the Holy Cross, January 2002.

D. S. Hall, "Death of a Bose-Einstein Condensate," Atomic Physics Seminar, University of Connecticut, April 2001.

D. S. Hall, "Birth and Death of a Bose-Einstein Condensate," Condensed Matter Seminar, University of Delaware, February 2001.

D. S. Hall, "Superatomic Physics with Bose-Einstein Condensates," Physics Department Colloquium, Mount Holyoke College, November 2000.

D. S. Hall, "Putting the Spin *in* a Bose-Einstein Condensate," Physics Department Colloquium, Williams College, April 2000.

D. S. Hall, "Vortices in a Bose-Einstein Condensate," Condensed Matter Seminar, University of Massachusetts, February 2000.

D. S. Hall, "Intertwined Bose-Einstein Condensates," Physics Department Colloquium, University of Michigan, January 2000.

D. S. Hall, "Intertwined Bose-Einstein Condensates," Modern Optics and Spectroscopy Seminar, Massachusetts Institute of Technology, November 1999.

D. S. Hall, "Vortices in a Bose-Einstein Condensate," Atomic Physics Colloquium, Yale University, November 1999.

D. S. Hall, "Measurement of the Relative Phase between Two Bose-Einstein Condensates" and "Intertwined Bose-Einstein Condensates," International School of Quantum Electronics, 27th Course: Bose-Einstein Condensation, Erice, Italy, October 1999.

D. S. Hall, "Topological Collective Excitations of a Binary Bose-Einstein Condensate," Macroscopic Quantum Coherence Phenomena, ICTP/SISSA, Trieste, Italy, July 1999.

D. S. Hall, "Dressed and Undressed Bose-Einstein Condensates," Keynote Speaker, Northwest Section Meeting, American Physical Society, Vancouver, British Columbia, May 1999.

D. S. Hall, "Bose-Einstein Condensation," AAAS Annual Meeting, Anaheim, California, January 1999.

D. S. Hall, "Superatomic Physics with Bose-Einstein Condensates," Physics Department Colloquium, Amherst College, December 1998.

D. S. Hall, "Quantum Beat Note between Bose-Einstein Condensates," Physics Seminar, University of Chicago, November 1998.

D. S. Hall, "Experiments with Interacting Bose-Einstein Condensates," Physics Division Colloquium, Oak Ridge National Laboratory, November 1998.

D. S. Hall, M. R. Matthews, C. E. Wieman, and E. A. Cornell, "Measurements of Relative Phase and Quantum Beat Note between Bose-Einstein Condensates," International Symposium on the Foundations of Quantum Mechanics (ISQM), Tokyo, Japan, August 1998.

D. S. Hall, J. R. Ensher, D. S. Jin, M. R. Matthews, C. E. Wieman, and E. A. Cornell,"Recent Experiments with Bose-Condensed Gases at JILA," Photonics West '98, San Jose, California, January 1998.

D. S. Hall, "Recent Progress Toward Cold Antihydrogen," Atomic Physics Colloquium, State University of New York at Stony Brook, October 1996.

Contributed Presentations

M. L. Goldman, E. S. Petrik, D. H. Guest, and D. S. Hall, "Vortex Lattices in a Crossed-Beam Optical Dipole Trap," Bulletin of the American Physical Society **53**, 104 (2008).

K. M. Mertes, J. W. Merrill, D. S. Hall, R. Carretero-Gonzalez, P. G. Kevrekidis, D. J. Frantzeskakis, and H. E. Nistazakis, "Determining s-wave Scattering Length Ratios from Binary Condensate Dynamics," Bulletin of the American Physical Society **51**, 17 (2006).

J. W. Merrill, K. M. Mertes, and D. S. Hall, "Measuring Two Body Inelastic Losses in a Rb-87 Condensate," Bulletin of the American Physical Society **51**, 44 (2006).

K. M. Mertes, T. Menon, and D. S. Hall, "New Features in Component Separation with Rotating and Nonrotating Binary Bose-Einstein Condensates," Bulletin of the American Physical Society **50**, 46 (2005).

M. H. Wheeler, J. D. Erwin, and D. S. Hall, "Interference between Bose-Einstein Condensates Independently Prepared in Two Spin States," Bulletin of the American Physical Society **49**, 96 (2004).

B. J. Samelson-Jones, E. A. Newman, N. J. Stokes, D. Krause, Jr., and D. S. Hall, "Progress Towards a Rb-87 Bose-Einstein Condensate with Tunable Interactions," Bulletin of the American Physical Society **46**, 104 (2001).

B. P. Anderson, P. C. Haljan, M. R. Matthews, D. S. Hall, C. E. Wieman, and E. A. Cornell, "Vortices in a Bose-Einstein Condensate," Bulletin of the American Physical Society **45**, (2000).

D. S. Hall, M. R. Matthews, P. C. Haljan, C. E. Wieman, and E. A. Cornell, "Real-Time Observation of Rabi Oscillations between Bose-Einstein Condensates," Bulletin of the American Physical Society **44** (Part 1), 586 (1999).

D. S. Hall, M. R. Matthews, J. R. Ensher, C. E. Wieman, and E. A. Cornell, "Component Separation and Phase Dynamics of a Binary Mixture of Bose-Einstein Condensates," ICAP XVI, 110 (1998).

G. Gabrielse, A. Khabbaz, D. S. Hall, C. Heimann, H. Kalinowsky, and W. Jhe, "A Measurement of the Antiproton and Proton Charge-to-Mass Ratios Using Two Simultaneously Trapped Ions," ICAP XVI, 72 (1998).

M. R. Matthews, D. S. Hall, J. R. Ensher, C. E. Wieman, and E. A. Cornell, "Dynamical Response of a Bose-Einstein Condensate to a Discontinuous Change in Internal State," Bulletin of the American Physical Society **43**, 1342 (1998).

A. Khabbaz, D. S. Hall, G. Gabrielse, C. Heimann, H. Kalinowsky, and W. Jhe, "Two Ions Simultaneously Trapped to Measure the Antiproton Charge-to-Mass Ratio," Bulletin of the American Physical Society **43**, 1317 (1998).

D. S. Hall, M. R. Matthews, J. R. Ensher, C. E. Wieman, and E. A. Cornell, "Experiments with Multiple Bose-Einstein Condensates at JILA," Bulletin of the American Physical Society **43**, 1250 (1998).

A. Khabbaz, D. S. Hall, G. Gabrielse, C. Heimann, H. Kalinowsky, and W. Jhe, "Measuring the Antiproton-Proton Charge-to-Mass Ratios to a Part in 10^{10}," Bulletin of the American Physical Society **42**, Postdeadline Papers (1997).

D. S. Hall, T. M. Roach, P. S. Yesley, A. Khabbaz, G. Gabrielse, C. Heimann, H. Kalinowsky, and W. Jhe, "Cold Antiprotons and Positrons Trapped Simultaneously," Bulletin of the American Physical Society **42**, Postdeadline Papers (1997).

References

Available upon request.