John L. Bohn

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Education

University of Chicago, Ph.D. in Physics, June 1995
Thesis Title: Development of Ridge Resonances in Helium
Thesis Advisor: Professor Ugo Fano

University of Chicago, B.S. 1988 in Mathematics

Honors

Fellow, American Physical Society, 2003
National Research Council Research Associateship, NIST, 1995-97
Bloomenthal Fellowship, University of Chicago, 1993-94

Academic Positions

Fellow, JILA, 2002-present
Associate Fellow, JILA, 2000-2002
Research Assistant Professor, University of Colorado, 2000-present
Assistant Professor, Attendant Rank, University of Colorado, 1999-2000
Senior Research Associate, JILA, 1997-2000
Lecturer, Department of Physics, University of Colorado, 1997-99
National Research Council Research Associate, NIST, Boulder, CO 1995-97
Research Assistant,University of Chicago, 1987-88, 1990-95

Memberships

DAMOP, American Physical Society
American Association of Physics Teachers

Research Interests

Cold collisions: Theory of atomic and molecular collisions in ultracold traps, laser-assisted collisions, photoassociation spectroscopy, control of cold atom collisions, and applications to quantum degenerate Bose and Fermi gases.

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Semiconductor devices: Theory of carrier transport through novel semiconductor device geometries; correlated motions of electrons and holes confined to quantum dots.

Few-body physics: Multiply excited states of atoms; correlated motion of atomic electrons and of electronic and nuclear motions in molecules.

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Publications

1. "Extracting Dynamics from Collision Data I: Analysis of Integral Angular Momentum"
J. Bohn and U. Fano, Phys. Rev. A **41**, 5953 (1990).

2."Observable Characteristics of Pure Quantum States"
J. Bohn, Phys. Rev. Lett. **66**, 1547 (1991).

3. "Phase-Amplitude Method Applied to Doubly-Excited States of He($^1S^e$)"
J. Bohn, Phys. Rev. A **49**, 3761 (1994).

4. "Multichannel Quantum Mechanics as a Hamiltonian Phase Flow"
J. Bohn and U. Fano, Phys. Rev. A **50**, 2893 (1994).

5. "Total Phase Description of Multiparticle Quantum Systems"
J. L. Bohn, Phys. Rev. A **51**, 1110 (1995).

6. "Fragmentation of Atomic Systems"
J. L. Bohn and U. Fano, Phys. Rev. A **53**, 4014 (1996).

7. "Semianalytic Treatment of Two-Color Photoassociation Spectroscopy and Control of Cold Atoms"
J. L. Bohn and P. S. Julienne, Phys. Rev. A **54**, R4637 (1996).

8. "Theory of Transport through an Array of Devices with Transverse Exit Leads"
J. L. Bohn, Phys. Rev. B **56**, 4132 (1997).

9. "Hartree-Fock Theory of Double Condensates"
B. D. Esry, C. H. Greene, J. P. Burke, and J. L. Bohn, Phys. Rev. Lett. **78**, 3594 (1997).

10. "Impact of the ^{87}Rb Singlet Scattering Length on Suppressing Inelastic Collisions"
J. P. Burke, J. L. Bohn, B. D. Esry, and C. H. Greene, Phys. Rev. A **55**, R2511 (1997).

11. "Prospects for Influencing Scattering Lengths with Far-off-Resonant Light"
J. L. Bohn and P. S. Julienne, Phys. Rev. A **56**, 1486 (1997).

12. "Dominance of Short-range Correlations in Photoejection-induced Excitation Processes"
K. W. Meyer, J. L. Bohn, C. H. Greene, and B. D. Esry, J. Phys. B **30**, L641 (1997).

13. "Prospects for Mixed-isotope Bose-Einstein Condensates in Rubidium"
J. P. Burke, J. L. Bohn, B. D. Esry, and C. H. Greene, Phys. Rev. Lett. **80**, 2097 (1998).

14. "Effective Potentials for Bose-Einstein Condensates"
J. L. Bohn, B. D. Esry, and C. H. Greene, Phys. Rev. A **58**, 584 (1998).

15. "Multichannel Cold Collisions: Simple Dependences on Energy and Magnetic Field"
J. P. Burke, C. H. Greene, and J. L. Bohn, Phys. Rev. Lett. **81**, 3355 (1998).

16. "Geometry and Symmetries of Multiparticle Systems"
U. Fano, D. Green, J. L. Bohn, and T. Heim, J. Phys. B **32**, R1 (1999).

17. "Ultracold Scattering Properties of the Short-Lived Rubidium Isotopes"
J. P. Burke and J. L. Bohn, Phys. Rev. A **59**, 1303 (1999).

18. "Collisional Properties of Ultracold Potassium: Consequences for Degenerate Bose and Fermi Gases"
J. L. Bohn, J. P. Burke, C. H. Greene, H. Wang, P. L. Gould, and W. C. Stwalley, Phys. Rev. A **59**, 3660 (1999).

19. "Semianalytic Theory of Laser-Assisted Resonant Cold Collisions"
J. L. Bohn and P. S. Julienne, Phys. Rev. A **60**, 414 (1999).

20. "Measurement of p-wave Threshold Law Using Evaporatively Cooled Fermionic Atoms"
B. DeMarco, J. L. Bohn, J. P. Burke, M. Holland, and D. S. Jin, Phys. Rev. Lett. **82**, 4208 (1999).

21. "Determination of ^{39}K Scattering Lengths Using Photoassociation Spectroscopy of the 0_g^- State"
J. P. Burke, C. H. Greene, J. L. Bohn, H. Wang, P. L. Gould, and W. C. Stwalley, Phys. Rev. A **60**, 4417 (1999).

22. "Molecular Spin Relaxation in Cold Atom-Molecule Scattering"
J. L. Bohn, Phys. Rev. A **61**, 040702 (2000).

23. "Collisions Near Threshold Involving Atoms and Molecules"
H. Sadeghpour, J. L. Bohn, M. J. Cavagnero, B. D. Esry, I. I. Fabrikant, J. Macek, and A. R. P. Rau, J. Phys. B **33**, R93 (2000).

24. "Cooper Pairing in Ultracold ^{40}K Using Feshbach Resonances"
J. L. Bohn, Phys. Rev. A **61**, 053409 (2000).

25. "Cold Collisions of O_2 with helium"
J. L. Bohn, Phys. Rev. A **62**, 032701/1-9 (2000).

26. "Many-Body Coulomb Problem in the Phase-Energy Representation"
J. L. Bohn, Physics Essays Vol. **13** (M. Inokuti and A. R. Prakash, Eds., 2000) p. 350.

27. "Ground State Scattering Length of ^{39}K Determined by Double-Resonance Photoassociation Spectroscopy"

H. Wang, A. N. Nikolov, J. R. Ensher, P. L. Gould, E. E. Eyler, W. C. Stwalley, J. P. Burke, Jr., J. L. Bohn, C. H. Greene, E. Tiesinga, C. J. Williams, and P. S. Julienne, Phys. Rev. A **62**, 052704/1-4 (2000).

28. "Inelastic collisions of ultracold polar molecules"
J. L. Bohn, Phys. Rev. A **63**, 052714/1-5 (2001).

29. "Ultracold collisions of oxygen molecules"
A. V. Avdeenkov and J. L. Bohn, Phys. Rev. A **64**, 052703/1-10 (2001).

30. "Nature of spinor Bose-Einstein condensates in rubidium"
N. N. Klausen, J. L. Bohn and C. H. Greene, Phys. Rev. A **64**, 053602/1-5 (2001).

31. "Field enhancement in apertureless near-field scanning optical microscopy"
J. L. Bohn, D. J. Nesbitt and A. Gallagher, J. Opt. Soc. Am. A **18**, 2998-3006 (2001).

32. "Resonant control of elastic collisions in an optically trapped Fermi gas of atoms"
T. Loftus, C. A. Regal, C. Ticknor, J. L. Bohn and D. S. Jin, Phys. Rev. Lett. **65**, 173201/1-4 (2002).

33. "Magnetic field effects in ultracold molecular collisions"
A. Volpi and J. L. Bohn, Phys. Rev. A **65**, 052712/1-8 (2002).

34. "Molecular vibration in ultracold collision theory"
A. Volpi and J. L. Bohn, Phys. Rev. A **65**, 064702 (2002).

35. "Collisional dynamics of ultracold OH molecules in an electrostatic field"
A. V. Avdeenkov and J. L. Bohn, Phys. Rev. A **66**, 052718/1-10 (2002).

36. "Rotational Feshbach resonances in ultracold molecular collisions"
J. L. Bohn, A. V. Avdeenkov and M. P. Deskevich, Phys. Rev. Lett. **89**, 203202/1-4 (2002).

37. "Tuning p-wave interactions in an ultracold Fermi gas of atoms"
C. A. Regal, C. Ticknor, J. L. Bohn and D. S. Jin, Phys. Rev. Lett. **90**, 053201/1-4 (2003).

38. "Linking ultracold polar molecules"
A. V. Avdeenkov and J. L. Bohn, Phys. Rev. Lett. **90**, 043006/1-4 (2003).

39. "Collisional robustness of ultracold molecular gases"
J. L. Bohn, A. V. Avdeenkov and A. Volpi, in Proceedings, Workshop of the Collaborative Computational Project on Heavy Particle Dynamics (2002).

40. "Prospects for Bose-Einstein condensation in ground state molecules"
J. L. Bohn, A. V. Avdeenkov and A. Volpi, in Proceedings, 11th International Laser Physics Workshop (in press).

41. “Fine-structure effects in vibrational relaxation at ultralow temperatures”
A. Volpi and J. L. Bohn, J. Chem. Phys. **119**, 866-871 (2003).

42. “Creation of ultracold molecules from a Fermi gas of atoms”
C. A. Regal, C. Ticknor, J. L. Bohn and D. S. Jin, Nature **424**, 47-50 (2003).

43. “Intensity dependence of photoassociation in a quanum degenerate atomic gas”
I. D. Prodan, M. Pichler, M. Junker, R. G. Hulet and J. L. Bohn, Phys. Rev. Lett. **91**, 080402/1-4 (2003).

44. “Detection of spatial correlations in an ultracold gas of fermions”
M. Greiner, C. A. Regal, C. Ticknor, J. L. Bohn and D. S. Jin, Phys. Rev. Lett. **92**, 150405/1-4 (2004).

45. “Field-linked states of ultracold polar molecules”
A. V. Avdeenkov, D. C. E. Bortolotti and J. L. Bohn, Phys. Rev. A. **69**, 012710/1-9 (2004).

46. “Multiplet structure of Feshbach resonances in non-zero partial waves”
C. Ticknor, C. A. Regal, D. S. Jin and J. L. Bohn, Phys. Rev. A **69**, 042712/1-6 (2004).

47. “Wave mechanics of a two wire atomic beamsplitter”
D. C. E. Bortolotti and J. L. Bohn, Phys. Rev. A **69**, 033607/1-8 (2004).

48. “Observation of heteronuclear Feshbach resonances in a mixture of bosons and fermions”
S. Inouye, J. Goldwin, M. L. Olsen, C. Ticknor, J. L. Bohn and D. S. Jin, Phys. Rev. Lett. **93**, 183201/1-4 (2004).

49. “Pair wave functions in atomic Fermi condensates”
A. V. Avdeenkov and J. L. Bohn, Phys. Rev. A **71**, 023609/1-5 (2005).

50. “Ultracold collisions for fermionic OD radicals”
A. V. Avdeenkov and J. L. Bohn, Phys. Rev. A **71**, 022706/1-6 (2005).

51. “Influence of magnetic fields on cold collisions of polar molecules”
C. Ticknor and J. L. Bohn, Phys. Rev. A **71**, 022709/1-10 (2005).

52. “Bose-Fermi mixtures near an interspecies Feshbach resonance: Testing a non-equilibrium approach”
D. Borolotti, A. V. Avdeenkov, C. Ticknor and J. L. Bohn, J. Phys. B: At. Mol. Opt. Phys. **39**, 189-203 (2006).

53. “Long range scattering resonances in strong-field seeking states of polar molecules”
C. Ticknor and J. L. Bohn, Phys. Rev. A **72**, 032717/1-8 (2005).

54. “Production of cold formaldehyde molecules for study and control of chemical reaction dynamics with hydroxyl radicals”

E. R. Hudson, C. Ticknor, B. C. Sawyer, C. A. Taatjes, H. J. Lewandowski, J. R. Bochinski, J. L. Bohn and J. Ye, Phys. Rev. A **73**, 063404/1-6 (2006).

55. "Suppression of inelastic collisions of polar $^1\Sigma$ state molecules in an electrostatic field" A. V. Avdeenkov, M. Kajita and J. L. Bohn, Phys. Rev. A **73**, 022707/1-7 (2006).

56. "Candidate molecular ions for an electron electric dipole moment experiment" E. R. Meyer, J. L. Bohn and M. P. Deskevich, Phys. Rev. A **73**, 062108/1-10 (2006).

57. "Bogoliubov modes of a dipolar condensate in a cylindrical trap" S. Ronen, D. C. E. Bortolotti and J. L. Bohn, Phys. Rev. A **74**, 013623/1-13 (2006).

58. "Stability of fermionic Feshbach molecules in a Bose-Fermi mixture" A. V. Avdeenkov, D. C. E. Bortolotti and J. L. Bohn, Phys. Rev. A **74**, 012709/1-6 (2006).

59. "Dipolar Bose-Einstein condensates with dipole dependent scattering length" S. Ronen, D. C. E. Bortolotti, D. Blume and J. L. Bohn, Phys. Rev. A **74**, 033611/1-11 (2006).

60. "Ultracold Rb-OH collisions and prospects for sympathetic cooling" M. Lara, J. L. Bohn, D. Potter, P. Soldan and J. Hutson, Phys. Rev. Lett. **97**, 183201/1-4 (2006).

61. "Scattering length instability in dipolar Bose-Einstein condensates" D. C. E. Bortolotti, S. Ronen, J. L. Bohn and D. Blume, Phys. Rev. Lett. **97**, 160402/1-4 (2006).

62. "Radial and angular rotons in trapped dipolar gases" S. Ronen, D. C. E. Bortolotti and J. L. Bohn, Phys. Rev. Lett. **98**, 030406/1-4 (2007).

63. "OH hyperfine ground state: From precision measurement to molecular qubits" B. L. Lev, E. R. Meyer, E. R. Hudson, B. C. Sawyer, J. L. Bohn and J. Ye, Phys. Rev. A **74**, 061402(R)/1-4 (2006).

64. "Cold collisions between OH and Rb: The field-free case" M. Lara, J. L. Bohn, D. E. Potter, P. Soldan and J. M. Hutson, Phys. Rev. A **75**, 012704/1-19 (2007).

65. "Pseudo-potential treatment of two aligned dipoles under external harmonic confinement" K. Kanjilal, J. L. Bohn and D. Blume, Phys. Rev. A **75**, 052705/1-9 (2007).

66. "Magnetoelectrostatic trapping of ground state OH molecules" B. C. Sawyer, B. L. Lev, E. R. Hudson, B. K. Stuhl, M. Lara, J. L. Bohn and J. Ye, Phys. Rev. Lett. **98**, 253002/1-4 (2007).

67. "p-wave Feshbach molecules"

J. P. Gaebler, J. T. Stewart, J. L. Bohn and D. S. Jin, Phys. Rev. Lett. **98**, 200403/1-4 (2007).

68. "Dipolar Bose-Einstein condensates at finite temperature"
S. Ronen and J. L. Bohn, Phys. Rev. A **76**, 043607/1-7 (2007).

69. "Influence of a humidor on the aerodynamics of baseballs"
E. R. Meyer and J. L. Bohn, Am. J. Phys. (in press).

70. "Manifestations of the roton mode in dipolar Bose-Einstein condensates"
R. M. Wilson, S. Ronen and J. L. Bohn, Phys. Rev. Lett. **200**, 245302/1-4 (2008).

71. "Prospects for an electron electric-dipole moment search in metastable ThO and ThF^+"
E. R. Meyer and J. L. Bohn, Phys. Rev. A **78**, 010502(R)/1-4 (2008).

Invited Presentations

"Phase-Amplitude Method in Helium"
Workshop on New Developments in Two-Electron Atoms and Ions, JILA, Boulder, CO, July 1992.

"Wave Function Evolution for Two-Electron Atoms on the Real Axis"
Workshop on Complex R-Plane Techniques, Charlottesville, VA, October 1993.

"Development of Ridge Resonances in Helium"
Workshop on Two-Electron Processes in Photon-Helium Interaction, JILA, Boulder, CO, January 1996.

"Collisional Properties of Ultracold ^{40}K: Consequences for Degenerate Fermi Gases"
Workshop on Collisions of Cold, Trapped Atoms, JILA, Boulder, CO, November 1997.

"How to Win Friends and Influence Cold Atoms"
Kansas State University, March 1998.

"How to Win Friends and Influence Cold Atoms"
ITAMP Workshop on Threshold Phenomena, Cambridge, MA, June 1998.

"Two, Three, Many: Hyperspherical Coordinate Representations of Several-Body Phenomena"
ITAMP Workshop on Threshold Phenomena, Cambridge, MA, June 1998.

"K-Harmonic Representation of Dilute Bose-Einstein Condensates"
Workshop on Hyperspherical Harmonic Methods in Atomic, Molecular, and Nuclear Theory, Institute for Nuclear Theory, Seattle, WA, January 1999.

"Molecular Spin Relaxation in Cold Atom-Molecule Collisions"
Workshop on Trapping, Spectroscopy, and Collisions of Ultracold Molecules, ITAMP, Cambridge, MA, July 1999.

"Cold Collisions of Potassium at the Turn of the Millennium"
European Laboratory for Nonlinear Spectroscopy (LENS), University of Florence, Italy, September 1999.

"Chemistry of Ultracold Atomic and Molecular Gases"
University of Colorado Chemical Physics Colloquium, Boulder, CO, November 1999.

"Cold Collisions of Atoms and Molecules"
University of Oregon Department of Physics, Eugene, OR, February 2000.

"As the molecules turn: Collisions in an ultracold molecular gas"
JILA Colloquium, Boulder, CO, November 2001.

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"As the molecules turn: Collision in an ultracold molecular gas"
Center for Ultracold Atoms Seminar, Harvard University, Cambridge, MA, January 2002.

"Prospects for BEC in ultracold molecules"
Laser Physics 2002 Workshop, Bratislava, Slovakia, July 2002.

"Linking ultracold polar molecules"
Resonances and Reflections: Profiles of Ugo Fano's Physics and its Influenes, ITAMP, Cambridge, MA, July 2002.