

# Deborah S. Jin

Updated: 5/5/2015

NIST-JILA  
University of Colorado  
440 UCB  
Boulder, CO 80309-0440

Tel. (303) 492-0256  
Email: jin@jilau1.colorado.edu

## Affiliations

NIST Fellow, Quantum Physics Division  
JILA Fellow  
Professor Adjoint, Physics Department, University of Colorado, Boulder

## Education

The University of Chicago, Ph.D. in Physics, June 1995  
Thesis Title: Experimental Study of the Phase Diagrams of Heavy Fermion Superconductors  
with Multiple Transitions.  
Thesis Advisor: Professor Thomas F. Rosenbaum  
  
Princeton University, A.B. 1990 in Physics, Magna Cum Laude.

## Appointments

NIST Fellow, 2005-present  
Professor Adjoint, Physics, University of Colorado, Boulder, January 2007-present  
Associate Professor Adjoint, Physics, University of Colorado, Boulder, 2004-present  
NIST physicist, 1997-2005  
Assistant Professor Adjoint, Physics, University of Colorado, Boulder, 1997-2004  
National Research Council Research Associateship, NIST-JILA, 1995-1997  
Research Assistant, University of Chicago, 1993-1995  
NSF Graduate Fellow, University of Chicago, 1990-1993

## Honors

“Most Influential Scientific Minds of 2014,” with Jun Ye, released from Thomson Reuters, 2014  
Isaac Newton Medal, Institute of Physics, 2014  
William H. Zachariasen Lecturer, University of Chicago, 2014  
Comstock Prize in Physics, National Academy of Sciences, 2014  
Maurer Lecturer, University of Arkansas, 2013  
L’Oreal-UNESCO Award for Women in Science, Laureate for North America, 2013  
Gold Medal, NIST, Department of Commerce, 2011  
Kathryn A. McCarthy Lectureship in Physics, Tufts, 2010  
Sigma Xi, The William Proctor Prize for Scientific Achievement, 2009  
Benjamin Franklin Medal in Physics, 2008  
Fellow of the American Academy of Arts and Sciences, 2007  
Bonfils-Stanton Foundation Award in Science and Medicine, 2006  
American Association for the Advancement of Science, 2006  
Elected to the National Academy of Sciences, 2005  
American Physical Society, I.I. Rabi Prize, 2005  
Scientific American 50: Research Leader of the Year, 2004  
Service to America Medal: Science and the Environment 2004  
Arthur S. Flemming Award (Scientific Category), 2003

John D. and Catherine T. MacArthur Fellowship, 2003  
Fellow of the American Physical Society, 2003  
National Academy of Sciences Award for Initiatives in Research, 2002  
Maria Goeppert-Mayer Award, 2002  
NIST Samuel W. Stratton Award, 2001  
Presidential Early Career Award for Scientists and Engineers, 2000  
ONR Young Investigator, 1999  
National Research Council Research Associateship - NIST, 1995-1997  
National Science Foundation Graduate Fellowship in Physics, 1990-1993  
Allen Goodrich Shenstone Prize, Princeton University, 1990

## Publications

1. *Uniaxial-stress anisotropy of the double superconducting transition in  $UPt_3$*   
D. S. Jin, S. A. Carter, B. Ellman, T. F. Rosenbaum, and D. G. Hinks, *Phys. Rev. Lett.* **68**, 1597 (1992).
2. *Pressure tuning of the double transition in thoriated  $UBe_{13}$*   
R. J. Zieve, D. S. Jin, T. F. Rosenbaum, J. S. Kim, and G. R. Stewart, *Phys. Rev. Lett.* **72**, 756 (1994).
3. *Low-temperature specific heat of  $U_{1-x}Th_xBe_{13}$*   
D. S. Jin, T. F. Rosenbaum, J. S. Kim, and G. R. Stewart, *Phys. Rev. B (Rapid Commun.)* **49**, 1540 (1994).
4. *H-T phase diagrams of the double transition in thoriated  $UBe_{13}$*   
D. S. Jin, S. A. Carter, T. E. Rosenbaum, J. S. Kim, and G. R. Stewart, *Phys. Rev. B* **53**, 8549 (1996).
5. *Dynamic Signature of the Mott-Hubbard transition in  $N(S,Se)_2$*   
A. Husmann, D. S. Jin, Y. V. Zastavker, T. F. Rosenbaum, X. Yao, and J. M. Honig, *Science* **274**, 1874 (1996).
6. *Quantitative studies of Bose-Einstein condensation in a dilute atomic vapor*  
D. S. Jin, J. R. Ensher, M. R. Matthews, C. E. Wieman, and E. A. Cornell, *Proc. of the 21st Intl. Conf. on Low Temp. Phys., Czech. J. Phys.* **46** S6, 3070 (1996).
7. *Bose-Einstein condensation in a dilute gas: Measurement of energy and ground-state occupation*  
J. R. Ensher, D. S. Jin, M. R. Matthews, C. E. Wieman, and E. A. Cornell, *Phys. Rev. Lett.* **77**, 4984 (1996).
8. *Collective excitations of a Bose-Einstein condensate in a dilute gas*  
D. S. Jin, J. R. Ensher, M. R. Matthews, C. E. Wieman, and E. A. Cornell, *Phys. Rev. Lett.* **77**, 420 (1996).
9. *Controlled symmetry breaking in superconducting  $UPt_3$*   
D. S. Jin, A. Husmann, T. F. Rosenbaum, T. E. Steyer, and K. T. Faber, *Phys. Rev. Lett.* **78**, 1775 (1997).
10. *Emergence of interaction effects in Bose-Einstein condensation*  
M. Holland, D. S. Jin, M. L. Chiofalo, and J. Cooper, *Phys. Rev. Lett.* **78**, 3801 (1997).

11. *Temperature-dependent damping and frequency shifts in collective excitations of a dilute Bose-Einstein condensate*  
D. S. Jin, M. R. Matthews, J. R. Ensher, C. E. Wieman, and E. A. Cornell, *Phys. Rev. Lett.* **78**, 764 (1997).
12. *Dynamical response of a Bose-Einstein condensate to a discontinuous change in internal state*  
M. R. Matthews, D. S. Hall, D. S. Jin, J. R. Ensher, C. E. Wieman, E. A. Cornell, F. Dalfovo, C. Minniti, and S. Stringari, *Phys. Rev. Lett.* **81**, 243 (1998).
13. *Recent experiments with Bose-condensed gases at JILA*  
D. S. Hall, J. R. Ensher, D. S. Jin, M. R. Matthews, C. E. Wieman, and E. A. Cornell, in *SPIE Proceedings* Vol. **3270**, 98 (1998).
14. *Exploring a quantum degenerate gas of fermionic atoms*  
B. DeMarco and D. S. Jin, *Phys. Rev. A* **58**, R4267 (1998).
15. *An enriched  $^{40}\text{K}$  source for fermionic atoms studies*  
B. DeMarco, H. Rohner, and D. S. Jin, *Rev. Sci. Instrum.* **70**, 1967 (1999).
16. *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).
17. *Onset of Fermi degeneracy in a trapped atomic gas*  
B. DeMarco and D. S. Jin, *Science* **285**, 1703 (1999).
18. *Evaporative cooling of a two-component degenerate Fermi Gas*  
M. J. Holland, B. DeMarco, and D. S. Jin, *Phys. Rev. A* **61**, 053610 (2000).
19. *Exploring a quantum degenerate Fermi gas*  
D. S. Jin, B. DeMarco, and S. Papp, *Atomic Physics 17*, edited by E. Arimondo, P. DeNatalle, and M. Inguscio (AIP 2001).
20. *Pauli blocking of collisions in a quantum degenerate atomic Fermi gas*  
B. DeMarco, S. B. Papp, and D. S. Jin, *Phys. Rev. Lett.* **86**, 5409 (2001).
21. *Transition from collisionless to hydrodynamic behavior in an ultracold Fermi gas*  
S. D. Gensemer and D. S. Jin, *Phys. Rev. Lett.* **87**, 173201 (2001).
22. *A two-species magneto-optical trap with  $^{40}\text{K}$  and  $^{87}\text{Rb}$*   
J. Goldwin, S. B. Papp, B. DeMarco, and D. S. Jin, *Phys. Rev. A* **65**, 021402 (2002).
23. *Spin Excitations in a Fermi gas of atoms*  
B. DeMarco and D. S. Jin, *Phys. Rev. Lett.* **88**, 040405 (2002).
24. *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.* **88**, 173201 (2002).
25. *A Fermi gas of atoms*  
D. S. Jin, *Physics World* **15**, 27 (2002).

26. *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 (2003).
27. *Measurement of positive and negative scattering lengths in a Fermi gas of atoms*  
C. A. Regal and D. S. Jin, *Phys. Rev. Lett.* **90**, 230404 (2003).
28. *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 (2003).
29. *Emergence of a molecular Bose-Einstein condensate from a Fermi gas*  
M. Greiner, C. A. Regal, and D. S. Jin, *Nature* **426**, 537-540 (2003).
30. *Observation of resonance condensation of fermionic atom pairs*  
C. A. Regal, M. Greiner, and D. S. Jin, *Phys. Rev. Lett.* **92**, 040403 (2004).
31. *Lifetime of molecule-atom mixtures near a Feshbach resonance in  $^{40}\text{K}$*   
C. A. Regal, M. Greiner, and D. S. Jin, *Phys. Rev. Lett.* **92**, 083201 (2004).
32. *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 (2004).
33. *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 (2004).
34. *Measurement of the interaction strength in a Bose-Fermi mixture with  $^{87}\text{Rb}$  and  $^{40}\text{K}$* ,  
J. Goldwin, S. Inouye, M. L. Olsen, B. Newman, B. D. DePaola, and D. S. Jin, *Phys. Rev. A* **70**, 021601 (2004).
35. *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 (2004).
36. *Probing the excitation spectrum of a Fermi gas in the BCS-BEC crossover regime*  
M. Greiner, C. A. Regal, and D. S. Jin, *Phys. Rev. Lett.* **94**, 070403 (2005).
37. *Probing pair-correlated fermionic atoms through correlations in atom shot noise*  
M. Greiner, C. A. Regal, J. T. Stewart, and D. S. Jin, *Phys. Rev. Lett.* **94**, 110401 (2005).
38. *Production efficiency of ultra-cold Feshbach molecules in bosonic and fermionic systems*  
E. Hodby, S. T. Thompson, C. A. Regal, M. Greiner, A. C. Wilson, D. S. Jin, E. A. Cornell, and C. E. Wieman, *Phys. Rev. Lett* **94**, 120402 (2005).
39. *Cross-dimensional relaxation in Bose-Fermi mixtures*  
J. Goldwin, S. Inouye, M. L. Olsen, and D. S. Jin, *Phys. Rev. A* **71**, 043408 (2005).
40. *Fermionic condensates*  
M. Greiner, C. A. Regal, and D. S. Jin, in *Atomic Physics 19: XIX International Conference on Atomic Physics*, **770** (2005).
41. *Momentum distribution of a Fermi gas of atoms in the BCS-BEC crossover*  
C. A. Regal, M. Greiner, S. Giorgini, M. Holland, and D. S. Jin, *Phys. Rev. Lett.* **95**, 250404 (2006).

42. *Understanding the superfluid phase diagram in trapped Fermi gases*  
Q. Chen, C. A. Regal, M. Greiner, D. S. Jin, and K. Levin, *Phys. Rev. A* **73**, 041601 (2006).
43. *Finite-temperature momentum distribution of a trapped Fermi gas*  
Q. Chen, C. A. Regal, D. S. Jin, and K. Levin, *Phys. Rev. A (Rapid Commun.)* **74**, 011601(R) (2006).
44. *Experimental realization of the BCS-BEC crossover with a Fermi gas of atoms*  
C. A. Regal and D. S. Jin, *Adv. Atom. Mol. Opt. Phys* **54**, 1-79 (2007).
45. *The potential energy of a  $^{40}\text{K}$  Fermi gas in the BCS-BEC crossover*  
J. T. Stewart, J. P. Gaebler, C. A. Regal, and D. S. Jin, *Phys. Rev. Lett.* **97**, 220406 (2006).
46. *Fermi gas experiments*  
D. S. Jin and C. A. Regal, in *Proceedings, International School of Physics "Enrico Fermi" course CLXIV* (IOS Press, Amsterdam, 2008).
47. *p-wave Feshbach molecules*  
J. P. Gaebler, J. T. Stewart, J. L. Bohn, and D. S. Jin, *Phys. Rev. Lett.* **98**, 200403 (2007).
48. *Ultracold dense gas of deeply bound heteronuclear molecules*  
S. Ospelkaus, A. Pe'er, K.-K. Ni, J. J. Zirbel, B. Neyenhuis, S. Kotochigova, P. S. Julienne, J. Ye, and D. S. Jin, *Nature Phys.* **4**, 622 (2008).
49. *Collisional stability of fermionic Feshbach molecules*  
J. J. Zirbel, K.-K. Ni, S. Ospelkaus, J. P. D'Incao, C. E. Wieman, J. Ye, and D. S. Jin, *Phys. Rev. Lett.* **100**, 143201 (2008).
50. *Heteronuclear molecules in an optical dipole trap*  
J. J. Zirbel, K.-K. Ni, S. Ospelkaus, T. L. Nicholson, M. L. Olsen, C. E. Wieman, J. Ye, D. S. Jin, and P. S. Julienne, *Phys. Rev. A* **78**, 013416 (2008).
51. *An atomic Fermi gas near a p-wave Feshbach resonance*  
D. S. Jin, J. P. Gaebler, and J. T. Stewart, *Proceedings of the International Conference on Laser Spectroscopy 2007*, Telluride, Colorado, ed. L. Hollberg, J. Bergquist and M. Kasevich, Telluride, Colorado, (World Scientific, 2008).
52. *Using photoemission spectroscopy to probe a strongly interacting Fermi gas*  
J. T. Stewart, J. P. Gaebler, and D. S. Jin, *Nature* **454**, 744 (2008).
53. *Bragg spectroscopy of a strongly interacting  $^{85}\text{Rb}$  Bose-Einstein condensate*  
S. B. Papp, J. M. Pino, R. J. Wild, S. Ronen, C. E. Wieman, D. S. Jin, and E. A. Cornell, *Phys Rev Lett.* **101**, 135301 (2008).
54. *A high phase-space-density gas of polar molecules*  
K.-K. Ni, S. Ospelkaus, M. H. G. de Miranda, A. Pe'er, B. Neyenhuis, J. J. Zirbel, S. Kotochigova, P. S. Julienne, D. S. Jin, and J. Ye, *Science* **322**, 231 (2008).
55. *Photoemission spectroscopy for ultracold atoms*

D. S. Jin, J. T. Stewart, and J. P. Gaebler, *2008 Proceedings of the International Conference on Atomic Physics*, Storrs, CT

56. *When is a quantum gas a quantum liquid?*  
J. M. Pino, R. J. Wild, S. B. Papp, S. Ronen, D. S. Jin, and E. A. Cornell, *2008 Proceedings of the International Conference on Atomic Physics*, Storrs, CT
57. *Coherent atom-molecule oscillations in a bose-fermi mixture*  
M. L. Olsen, J. D. Perreault, T. D. Cumby, and D. S. Jin, *Phys. Rev. A.*, **80**, 030701R (2009).
58. *Ultracold polar molecules near quantum degeneracy*  
S. Ospelkaus, K.-K. Ni, M. H. G. de Miranda, B. Neyenhuis, D. Wang, S. Kotochigova, P. S. Julienne, D. S. Jin, and J. Ye, *Faraday Discussions* **142**, 351 - 359 (2009).
59. *A dipolar gas of ultracold molecules*  
K.-K. Ni, S. Ospelkaus, D. J. Nesbitt, J. Ye, and D. S. Jin, *Phys. Chem. Chem. Phys.* **11**, 9626-39 (2009).
60. *Quantum-state controlled chemical reactions of ultracold potassium-rubidium molecules*  
S. Ospelkaus, K.-K. Ni, D. Wang, M. H. G. de Miranda, B. Neyenhuis, G. Quémener, P. S. Julienne, J. L. Bohn, D. S. Jin, and J. Ye, *Science* **327**, 853-857 (2010).
61. *Controlling the hyperfine state of rovibronic ground-state polar molecules*  
S. Ospelkaus, K.-K. Ni, G. Quémener, B. Neyenhuis, D. Wang, M. H. G. de Miranda, J. L. Bohn, J. Ye, and D. S. Jin, *Phys. Rev. Lett.* **104**, 030402 (2010).
62. *Direct absorption imaging of ultracold polar molecules*  
D. Wang, B. Neyenhuis, M. H. G. de Miranda, K.-K. Ni, S. Ospelkaus, D. S. Jin, and J. Ye, *Phys. Rev. A* **81**, 061404(R) (2010).
63. *Dipolar collisions of polar molecules in the quantum regime*  
K.-K. Ni, S. Ospelkaus, D. Wang, G. Quémener, B. Neyenhuis, M. H. G. de Miranda, J. L. Bohn, J. Ye, and D. S. Jin, *Nature* **464**, 1324-1328 (2010).
64. *Polar molecules near quantum degeneracy*  
J. Ye and D. S. Jin, in *Laser Spectroscopy XIX*, H. Katori, H. Yoneda, K. Nakagawa, F. Shimizu, Eds., World Scientific, Singapore, pp. 247-255 (2010).
65. *Observation of pseudogap behaviour in a strongly interacting Fermi gas*  
J. P. Gaebler, J. T. Stewart, T. E. Drake, D. S. Jin, A. Perali, P. Pieri, and G. C. Strinati, *Nature Phys.* **6**, 569-573 (2010).
66. *Verification of universal relations in a strongly interacting Fermi gas*  
J. T. Stewart, J. P. Gaebler, T. E. Drake, and D. S. Jin, *Phys. Rev. Lett.* **104**, 235301 (2010).
67. *Evolution of the Normal State of a Strongly Interacting Fermi Gas from a Pseudogap Phase to a Molecular Bose Gas*  
A. Perali, P. Pieri, F. Palestini, G. C. Strinati, J. T. Stewart, J. P. Gaebler, T. E. Drake, and D. S. Jin, *Phys. Rev. Lett.* **106**, 060402 (2011).

68. *Controlling the quantum stereodynamics of ultracold bimolecular reactions*  
M. H. G. de Miranda, A. Chotia, B. Neyenhuis, D. Wang, G. Quemener, S. Ospelkaus, J. L. Bohn, J. Ye, and D. S. Jin, *Nature Phys.* **7**, 502-507 (2011).
69. *Photon counting for Bragg spectroscopy of quantum gases*  
J. M. Pino, R. J. Wild, P. Makotyn, D. S. Jin, and E. A. Cornell, *Phys. Rev. A* **83**, 033615 (2011).
70. *Polar molecules in the quantum regime*  
D. S. Jin and J. Ye, *Physics Today* **64**, pp. 27-31, (2011).
71. *Measurements of Tan's contact in an atomic Bose-Einstein condensate*  
R. J. Wild, P. Makotyn, J. M. Pino, E. A. Cornell, and D. S. Jin, *Phys. Rev. Lett.* **108**, 145305 (2012).
72. *Long-lived dipolar molecules and Feshbach molecules in a 3D optical lattice*  
A. Chotia, B. Neyenhuis, S. A. Moses, B. Yan, J. P. Covey, M. Foss-Feig, A. M. Rey, D. S. Jin, and J. Ye, *Phys. Rev. Lett.* **108**, 080405 (2012).
73. *Direct observation of the Fermi surface in an ultracold atomic gas*  
T. E. Drake, Y. Sagi, R. Paudel, J. T. Stewart, J. P. Gaebler, and D. S. Jin, *Phys. Rev. A* **86**, 031601(R) (2012).
74. *Anisotropic Polarizability of Ultracold Polar  $^{40}\text{K}$   $^{87}\text{Rb}$  Molecules*  
B. Neyenhuis, B. Yan, S. A. Moses, J. P. Covey, A. Chotia, A. Petrov, S. Kotochigova, J. Ye, and D. S. Jin, *Phys. Rev. Lett.* **109**, 230403 (2012).
75. *Measurement of the Homogeneous Contact of a Unitary Fermi gas*  
Y. Sagi, T. E. Drake, R. Paudel, D. S. Jin, *Phys. Rev. Lett.* **109**, 220402 (2012).
76. *Introduction to Ultracold Molecules: New Frontiers in Quantum and Chemical Physics*  
D. S. Jin and J. Ye, *Chem. Rev.* **112**, 4801-4802 (2012).
77. *Feshbach-molecule formation in a Bose-Fermi mixture*  
T. D. Cumby, R. A. Shewmon, M.-G. Hu, J. D. Perreault, and D. S. Jin, *Phys. Rev. A* **87**, 012703 (2013).
78. *Observation of dipolar spin-exchange interactions with lattice-confined polar molecules*  
B. Yan, S. A. Moses, B. Gadway, J. P. Covey, K. R. A. Hazzard, A. M. Rey, D. S. Jin, and J. Ye, *Nature*, **501**, 521-525 (2013).
79. *Tests of universal three-body physics in an ultracold Bose-Fermi mixture*  
R. S. Bloom, M.-G. Hu, T. D. Cumby, and D. S. Jin, *Phys. Rev. Lett.* **111**, 105301 (2013).

80. *Universal dynamics of a degenerate unitary Bose gas*  
P. Makotyn, C. E. Klauss, D. L. Goldberger, E. A. Cornell, and D. S. Jin, *Nature Physics* **10**, 116-119 (2014).
81. *Probing local quantities in a strongly interacting Fermi gas*  
Y. Sagi, T. E. Drake, R. Paudel, R. Chapurin and D. S. Jin, *ICOLS* **267**, 012010 (2013).
82. *Suppressing the loss of ultracold molecules via the continuous quantum Zeno effect*  
B. Zhu, B. Gadway, M. Foss-Feig, J. Schachenmayer, M. L. Wall, K. R. A. Hazzard, B. Yan, S. A. Moses, J. P. Covey, D. S. Jin, J. Ye, M. Holland, and A. M. Rey, *Phys. Rev. Lett.* **112**, 070404 (2014).
83. *Differential scattering and rethermalization in ultracold dipolar gases*  
J. L. Bohn and D. S. Jin, *Phys. Rev. A* **89** 022702 (2014).
84. *Avalanche-mechanism loss at an atom-molecule Efimov resonance*  
M.-G. Hu, R. S. Bloom, D. S. Jin, and J. M. Goldwin, *Phys. Rev. A* **90**, 013619 (2014).
85. *Many-body dynamics of dipolar molecules in an optical lattice*  
K. R. A. Hazzard, B. Gadway, M. Foss-Feig, B. Yan, S. A. Moses, J. P. Covey, N. Y. Yao, M. D. Lukin, J. Ye, D. S. Jin, and A. M. Rey, *Phys. Rev. Lett.* **113**, 195302 (2014).
86. K. Aikawa, A. Frisch, M. Mark, S. Baier, R. Grimm, J. L. Bohn, D. S. Jin, G. M. Bruun, and F. Ferlaino, "Anisotropic Relaxation Dynamics in a Dipolar Fermi Gas Driven Out of Equilibrium," *Phys. Rev. Lett.* **113**, 263201, (2014).
87. *Breakdown of Fermi liquid description for strongly interacting Fermions*  
Y. Sagi, T. E. Drake, R. Paudel, R. Chapurin and D. S. Jin, *Phys. Rev. Lett.* **114**, 075301 (2015).