J. V. Porto

Joint Quantum Institute,
NIST and the University of Maryland,
PSC 2147
College Park, MD 20742

phone:(301) 405-0854
email: porto@jqi.umd.edu

Education

CORNELL UNIVERSITY — Ithaca, NY
Ph.D., Physics, August 1996
Thesis: Superfluidity of ^{3}He in aerogel
Thesis Adviser: Professor J. M. Parpia

UNIVERSITY OF NORTH CAROLINA — Chapel Hill, NC
Bachelor of Science (Highest Honors) in Physics, Jun 1990
Honors Thesis: Exciton Binding Energies in $Ga_{1-x}In_xSe$.
Thesis Advisor: Professor L. E. McNeil

Research Positions

JOINT QUANTUM INSTITUTE — College Park, MD
2006-present *Fellow, Joint Quantum Institute*
Adjunct Professor, University of Maryland

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY — Gaithersburg, MD
2000-present *Research Physicist-* Laser Cooling and Trapping group
Research on ultra-cold atoms in optical lattices, quantum degenerate mixtures

1998-2000 **National Research Council Fellow-EBIT group**
Research on atomic physics of highly charged ions in an EBIT.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY — Cambridge, MA
1996-1998 *Research Physicist- D. E. Pritchard's group*
Single trapped ion mass spectrometry, metrological atomic mass measurements of ^{23}Na, ^{85}Rb, ^{87}Rb and ^{133}Cs to accuracy of 2 10^{-10}.

CORNELL UNIVERSITY — Ithaca, NY
1992-1996 *Graduate Research Assistant- J. M. Parpia's group*
Research on quantum fluids and the effects of disorder on phase transitions in superfluid ^{3}He and ^{3}He/^{4}He mixtures within aerogel.

UNIVERSITY OF NORTH CAROLINA — Chapel Hill, NC
1989-1990 *Undergraduate Physics Research Project*
Studied Indium doping in exciton binding energies of $Ga_{1-x}In_xSe$.

J. V. Porto

Publications

77. **Nonlinear looped band structure of Bose-Einstein condensates in an optical lattice**.
Koller, S. B., Goldschmidt, EA, Brown, R C, Wyllie, R, Wilson, RW, Porto, J. V.
Phys. Rev. Lett. 63634, 1–6 (2016).
76. **Anomalous Broadening in Driven Dissipative Rydberg Systems**
Goldschmidt, Boulier, Brown, Koller, Young, Gorshkov, Rolston, Porto,
Physical Review Letters 116 113001 (2016)
75. **Degenerate Bose-Fermi mixtures of rubidium and ytterbium**.
VD Vaidya, J Tiamsuphat, SL Rolston and JV Porto,
Physical Review A, **92**(4), 043604 (2015).
74. **Magic wavelengths for the 5s–18s transition in rubidium.**
Goldschmidt, Norris, Koller, Wyllie, Brown, Porto, Safronova, Safronova,
Physical Review A, **91**(3), 032518 (2015).
73. **Two-dimensional superexchange- mediated magnetization dynamics in an optical lattice**.
R C Brown, R Wyllie, S B Koller, E A Goldschmidt, M Foss-Feig, and JV Porto,
Science, **348** (6234), 540 (2015).
72. **Continuous all-optical deceleration and single-photon cooling of molecular beams.**
Jayich, A., Vutha, A., Hummon, M., Porto, J., & Campbell, W.
Phys. Rev. A, **89**, 023425 (2014)
71. **Quantum interference and light polarization effects in unresolvable atomic lines: Application to a precise measurement of the ^{6,7}Li D2 lines**
Brown, RC, Wu, S, Porto, JV, Sansonetti, CJ, Simien, CE, Brewer, SM, Gillaspy, JD
Phys. Rev. A, **87**, 032504 (2013)
70. **Cold-atom magnetism**
Porto, JV, *Science*, **340**, 1297 (2013)
69. **Precision Measurement of Transition Matrix Elements via Light Shift Cancellation**
Herold, C. Vaidya, V. Li, X. Rolston, S. Porto, J. Safronova, M.
Phys. Rev. A, **86**, 243003 (2012)
68. **Dynamically slowed collapse of a Bose-Einstein condensate with attractive interactions**
Compton, R. Lin, Y.-J. Jiménez-García, K. Porto, J. Spielman, I.
Phys. Rev. A, **86**, 063601 (2012)
67. **Interaction-induced excited-band condensate in a double-well optical lattice**
Zhou, Q. and Porto, J. V. and Das Sarma, S.,
Phys. Rev. A, **84**, 031607 (2011)
66. **Absolute Transition Frequencies and Quantum Interference in a Frequency Comb Based Measurement of the ^{6,7}Li D Lines**
CJ Sansonetti, CE Simien, JD Gillaspy, JN Tan, SM Brewer, RC Brown, SJ Wu, and JV Porto
Phys. Rev. Lett. 107, 023001 (2011)
65. **Pulsed Sisyphus Scheme for Laser Cooling of Atomic (Anti)Hydrogen**
SJ Wu, RC Brown, WD Phillips, and JV Porto, Phys. Rev. Lett. 106, 0213001 (2011)
64. **Condensates induced by interband coupling in a double-well lattice**
Q Zhou, JV Porto, and S Das Sarma, Phys. Rev. B. 83, 195106 (2011)
63. **A synthetic electric force acting on neutral atoms**
YJ Lin, RI Compton, K Jimenez-Garcia, WD Phillips, JV Porto, and IB Spielman
Nature Physics 7, 531 (2011)
62. **Optical Lattices: More than a look**
JV Porto, Nature Physics 7, 280 (2011)

61. **Differential Light-Shift Cancellation in a Magnetic-Field-Insensitive Transition of 87Rb**
R Chicireanu, KD Nelson, S Olmschenk, N Lundblad, A Derevianko, and JV Porto
Phys. Rev. Lett. 106, 063002 (2011)
60. **Randomized benchmarking of atomic qubits in an optical lattice**
S Olmschenk, R Chicireanu, KD Nelson, and JV Porto,
New Journal of Physics 12, 113007 (2010)
59. **Phases of a Two-Dimensional Bose Gas in an Optical Lattice**
Jimenez-Garcia, K.; Compton, R. L.; Lin, Y. –J, Phillips, Porto, Spielman
Phys. Rev. Lett. **105** (2010)
58. **Adiabatic preparation of many-body states in optical lattices**
Sorensen, AS; Altman, E; Gullans, M, Porto, JV; Lukin, MD; and Demler, E
Phys. Rev. A **81** 061603 (2010)
57. **Experimental observation of magic-wavelength behavior of Rb atoms in an optical lattice**
Lundblad, N; Schlosser, M; Porto, JV
Phys. Rev. A, **81** 031611 (2010)
56. **Synthetic magnetic fields for ultracold neutral atoms**
Lin, Y. J.; Compton, R. L.;Jimenez-Garcia, K.; Porto, J. V. Spielman, I. B.
Nature **462** 628 (Dec 2009)
55. **Multiphoton Magneto-optical Trap**
Wu, S. J. and Plisson, T. and Brown, R. C. and Phillips, W. D. and Porto, J. V
Phys.Rev. Lett. **103** 173003 (Oct 2009)
54. **Effective three-body interactions of neutral bosons in optical lattices**
Johnson, P. R. and Tiesinga, E. and Porto, J. V. and Williams, C. J.
New Journal of Physics **11** 093022 (Sep 2009)
53. **Field-sensitive addressing and control of field-insensitive neutral-atom qubits**
N. Lundblad, J. M. Obrecht, I. B. Spielman, J. V. Porto
Nature Physics **5** 575 (5 July 2009)
52. **Quantum and classical dynamics of a BEC in a large-period optical lattice**
J. H. Huckans, I. B. Spielman, B. Laburthe Tolra, W. D. Phillips, and J. V. Porto
Phys. Rev. A Jul 16, 2009
51. **Rapid production of Rb-87 Bose-Einstein condensates in a combined magnetic and optical potential,** Lin YJ, Perry AR, Compton RL, Spielman IB and Porto JV
Phys. Rev. A **79**, 063631 (2009)
50. **Bose Einstein condensate in a uniform light-induced vector potential**
Lin, Y. J., Compton, R. L.,Perry, A. R., Phillips, W. D., Porto, J. V., Spielman, I. B.
Phys. Rev. Lett **102,** 13401 (2009)
49. **Influence of the trap shape on the detection of the superfluid - Mott-insulator transition**
Ma PN, Yang KY, Pollet L, Porto J.V., Troyer M., and Zhang F.C.
Phys. Rev. A **78,** 023605 (2008)
48. **Optimal control of atom transport for quantum gates in optical lattices**
De Chiara G, Calarco T, Anderlini M, Montangero, Lee P.J., Brown L, Phillips and Porto J.V.
Phys. Rev. A **77,** 052333 (2008)
47. **Improving correlations with Inelastic Loss**
J.V. Porto
Science **300** (5881) 1300 (2008).
46. **Atoms in a radiofrequency-dressed optical lattice**
N. Lundblad, P. J. Lee, I. B. Spielman, B. L. Brown, W. D. Phillips, and J. V. Porto
Phys. Rev. Lett. **100,** 150401 (2008)
45. **Condensate fraction in a 2D Bose gas measured across the Mott-insulator transition**
I. B. Spielman, W. D. Phillips, and J. V. Porto
Phy. Rev. Lett. **100,** 120402 (2008)

44. **Scaling results for superfluid He-3 in 98% open aerogel**
J.M. Parpia, A.D. Fefferman, J.V. Porto, V.V. Dmitriev, L.V. Levitin, and D.E. Zmeev, JLTP **150**, n. 3-4, 482 (2008)
43. **Accumulation and thermalization of cold atoms in a finite-depth magnetic trap**
R. Chicireanu, Q. Beaufils, A. Pouderous, B. Laburthe-Tolra, E. Maréchal, J. V. Porto, L. Vernac, J. C. Keller, and O. Gorceix
Phys. Rev. A **76**, 023406 (2007)
42. **Controlled exchange interactions between pairs of neutral atoms in an optical lattice.**
M. Anderlini, P. J. Lee, B. L. Brown, J. Sebby-Strabley, W. D. Phillips and J. V. Porto
Nature **448**, 452 (2007)
41. **Sublattice addressing and spin-dependent motion of atoms in a double-well lattice.**
P.J. Lee, M. Anderlini, B. L. Brown, J. Sebby-Strabley, W. D. Phillips and J. V. Porto
Phys. Rev. Lett. **99**, 020402 (2007)
40. **Preparing and probing atomic number states with an atom interferometer.**
J. Sebby-Strabley, B.L. Brown, M. Anderlini, P.J. Lee, W.D. Phillips, J.V. Porto, P.R. Johnson
Phys. Rev. Lett. **98**, 200405 (2007)
39. **Mott insulator transition in a two-dimensional atomic Bose gas**.
IB Spielman, WD Phillips and JV Porto
Phys. Rev. Lett. **98** 080404 (2007).
38. **Controlled atom dynamics in a double-well optical lattice.**
M Anderlini, J Sebby-Strabley, J Krus, JV Porto and WD Phillips
J. Phys. B: At. Mol. Opt. Phys. 39, S199-S210 (2006).
37. **Lattice of double wells for manipulating pairs of cold atoms.**
J. Sebby-Strabley, M. Anderlini, PS Jessen and JV Porto
Phys. Rev. A **73**, 033605 (2006).
36. **The role of interactions, tunneling, and harmonic confinement on the adiabatic loading of bosons in an opticall lattice.**
AM Rey, G Pupillo and JV Porto.
Phys. Rev. A **73**, 023608 (2006).
35. **Collisional deexcitation in a quasi-two-dimensional degenerate bosonic gas.**
IB Spielman, PR Johnson, JH Huckans, CD Fertig, SL Rolston, WD Phillips and JV Porto.
Phys. Rev. A **73**, 020702 (2006).
34. **Strongly inhibited transport of a degenerate 1D Bose gas in lattice**.
CD Fertig, KM ~O'Hara, JH Huckans, SL Rolston, WD Phillips and JVPorto.
Phys. Rev. Lett. **94**, 120403 (2005).
33. **Study of a 1D interacting quantum Bose gas**.
B Laburthe, KM O'Hara, JH Huckans, M Anderlini, JV Porto, SL Rolston , WD Phillips,
Journal De Physique IV 116: 227 (2004).
32. **Observation of reduced three-body recombination in a Correlated 1D Bose gas.**
B. Laburthe Tolra, KM O'Hara, J Huckans, SL Rolston, WD Phillips and JVPorto.
Phys. Rev. Lett. **92**, 190401 (2004).
31. **Experimental Study of a Bose Gas in One Dimension**.
B Laburthe Tolra, KM O'Hara, J Huckans, SL Rolston, WD Phillips and JV Porto.
in Laser Spectroscopy: Proceedings of the 16th International Conference on Laser Spectroscopy, World Scientific eds. P. Hannaford, A. Sidorov, H. Bachor and K. Baldwin (2004), p.124.
30. **Adiabatic loading of bosons into optical lattices.**
PB Blakie and JV Porto.
Phys. Rev. A **69**, 013603 (2004).

29. **Quantum information with neutral atoms as qubits.**
JV Porto, S Rolston, B Laburthe-Tolra, CJ Williams, and WD Phillips.
Philos. Trans. R. Soc. Lond. Ser. A **361**, 1808, p.1417-1427 (2003).
28. **Patterned loading of a Bose-Einstein condensate into an optical lattice.**
S Peil, JV Porto, B Laburthe-Tolra, JM Obrecht, BE King, M Subbotin, S Rolston, and WD Phillips.
Phys. Rev. A **67**, 051603 (2003).
27. **Precise measurements of the masses of Cs, Rb and Na – A new route to the fine structure constant.**
S Rainville, MP Bradley, JV Porto, JK Thompson, and DE Pritchard.
Hyperfine Interactions **132**, 1-4, 177 (2001).
26. **Series solution for the image charge fields in arbitrary cylindrically symmetric Penning traps.**
JV Porto. Phys. Rev. A **6402**, art. no.-023403 (2001).
25. **Analysis of broadband x-ray spectra of highly charged krypton from a microcalorimeter detector of an electron-beam ion trap.**
I Kink, JM Laming, E Takacs, JV Porto, JD Gillaspy, E Silver, H Schnopper, SR Bandler, M Barbera, N Brickhouse, S Murray, N Madden, D Landis, J Beeman, EE Haller
Phys. Rev. E **6304**, 046409 (2001).
24. **Microcalorimeter/EBIT measurements of X-ray spectra of highly charged ions.**
I Kink, JM Laming, E Takacs, JV Porto, JD Gillaspy, ESilver, H Schnopper, SR Bandler, M Barbera, N Brickhouse, S Murray, N Madden, D Landis, J Beeman, and EE Haller,
Physica Scripta **T92**, 454 (2001).
23. **Scaling properties of superfluid ^{3}He in aerogel.**
G Lawes, SCJ Kingsley, A Golov, N Mulders, JV Porto, JM Parpia,
J. Low Temp. Phys. **121**, 5-6 567 (2000).
22. **Emission-line intensity ratios in Fe XVII observed with a microcalorimeter on an electron beam ion trap,**
JM Laming, I Kink, E Takacs, JV Porto, J Gillaspy, E Silver, H Schnopper, S Bandler, N Brickhouse, SS Murray, M Barbera, AK Bhatia, GA Doschek, N Madden, D Landis, J Beeman, and EE Haller,
Astrophys. J. **545**, 2 L161 (2000).
21. **Direct Imaging of Highly Charged Ions in an Electron Beam Ion Trap,**
JV Porto, I Kink and JD Gillaspy,
Rev. Sci. Instrum. **71**, 3050 (2000).
20. **Laboratory Astrophysics Survey of Key Diagnostic Lines Using a Microcalorimeter on an Electron Beam Ion Trap,**
E Silver, H Schnopper, S Bandler, N Brickhouse, S Murray, M Barbera, E Takacs, JD Gillaspy, JV Porto, I Kink, JM Laming, N Madden, D Landis, J Beeman, and E Haller,
Astrophys. J. **541**, 1 495 (2000).
19. **Laboratory Astrophysics and Microanalysis with NTD-Germanium-based X-ray Microcalorimeters,**
E Silver, H Schnopper, S Bandler, S Murray, N Madden, D Landis, J Beeman, E Haller, M Barbera, G Tucker, JD Gillaspy, E Takacs, and JV Porto,
NIM A **444** (2000) 156-160.
18. **UV light from the ground term of Ti-like ytterbium, tungsten and bismuth,**
JV Porto, I Kink and JD Gillaspy,
Phys. Rev. A. **61**, 4501 (2000).
17. **^{3}He superfluidity in the presence of aerogel,**
A Golov, JV Porto, DA Geller, N Mulders, GJ Lawes, JM Parpia,
Physica B **280**: (1-4) 134-139 (2000).

16. **Penning trap measurements of the masses of ^{133}Cs, ^{85,87}Rb, and ^{23}Na**
    MP Bradley, JV Porto, S Rainville, JK Thompson and DE Pritchard,
    Phys. Rev. Lett. **83**, 4510 (1999).
15. **Correlated disorder in a p-wave superfluid,**
    JV Porto and JM Parpia.
    Phys. Rev. B **59**, 14583 (1999).
14. **^{3}He in aerogel - an inhomogeneously disordered unconventional superfluid,**
    A Golov, JV Porto and JM Parpia,
    J Low Temp Phys. **113**: (3-4), 329 (1998).
13. **^{3}He in 99.5% porous aerogel at the normal-superfluid transition,**
    SCJ Kingsley, G Lawes, A Golov, JV Porto, EN Smith, N Mulders,
    MHW Chan, and JM Parpia,
    J Low Temp Phys **113**: (3-4), 357 (1998).
12. **Suppression of ^{3}He superfluidity by aerogel.**
    JV Porto, A Golov, K Matsumoto, RD Biggar and JM Parpia.
    J Non-Cryst Solids **225**: (1), 205 (1998).
11. **Superfluidity of ^{3}He in aerogel covered with a thick ^{4}He film,**
    A Golov, JV Porto and JM Parpia.
    Phys. Rev. Lett. **80**, 4486 (1998).
10. **Superfluidity of pure ^{3}He and mixtures of ^{3}He and ^{4}He in aerogel,**
    A Golov, JV Porto, K Matsumoto, L Pollack, EN Smith, RD Biggar, TL Ho, and Parpia.
    J Low Temp Phys **110**: (1-2), 515 (1998).
9. **Capillary condensation of phase separated liquid ^{3}He-^{4}He mixtures in aerogel,**
    A Golov, JV Porto and JM Parpia.
    J Low Temp Phys **110**: (1-2), 591 (1998).
8. **Quantum phase transition of ^{3}He in aerogel at a nonzero pressure,**
    K Matsumoto, JV Porto, L Pollack, EN Smith, TL Ho, and JM Parpia.
    Phys Rev Lett **79** 253 (1997).
7. **Aerogel: Impurities in superfluid ^{3}He?,**
    JV Porto and JM Parpia
    Czech J Phys **46**: 2981 Suppl. 6 (1996).
6. **The effect of surface He-4 on superfluid He-3 in aerogel,**
    JV Porto and JM Parpia,
    Czech J Phys **46**: 123-124 Suppl. 1 (1996).
5. **An experiment to measure the effect of magnetic fields on the superfluid fraction and transition temperature of He-3 in aerogel,**
    JV Porto, L Pollack, K Matsumoto, EN Smith, and JM Parpia.
    Czech J Phys **46**: 125-126 Suppl. 1 (1996).
4. **Superfluid ^{3}He in aerogel**
    JV Porto and JM Parpia
    Phys. Rev. Lett. **74**, 4667, (1995).
3. **Superfluid ^{3}He in aerogel,**
    JV Porto, L Pollack, K Matsumoto, EN Smith, and JM Parpia
    J Low Temp Phys **101**: (3-4), 397 (1995).
2. **Two methods of fabricating reliable superconducting joints with multifilamentary Nb-Ti wire**,
    S. Phillips, J.V. Porto and J.M. Parpia
    J. Low Temp. Phys. **101**, 581, (1995).
1. **Diffusion welds between copper and silver alloys,**
    JV Porto and JM Parpia,
    Physica B, **194-196**, 857 (1994).