Bibliography

[1] S. Bose. *Z. Phys.*, **26**:178, 1924.

[2] A. Einstein. *Sitzungsber. Preuss. Akad. Wiss.*, **261**, 1924.

[3] A. Einstein. *Sitzungsber. Preuss. Akad. Wiss.*, **3**:18, 1925.

[4] W. Ketterle. Nobel Lecture: When atoms behave as waves: Bose Einstein condensation and the atom laser. *Rev. Mod. Phys.*, **261**:1131, 2002.

[5] E. A. Cornell and C. E. Wieman. Nobel Lecture; Bose Einstein condensation in a dilute gas; The first 70 years and some recent experiments. *Rev. Mod. Phys.*, **74**:875, 2002.

[6] M. H. Anderson, J. R. Ensher, M. R. Matthews, C. E. Wieman and E. A. Cornell. Observation of Bose Einstein condensation in dilute atomic vapor. *Science.*, **269**:198, 1995.

[7] K. B. Davis, M.-O. Mewes, M. R. Andrews, N. J. van Druten, D. S. Durfee, D. M. Kurn and W. Ketterle. Bose Einstein condensation in a gas of sodium atoms. *Phys. Rev. Lett.*, **75**:3969, 1995.

[8] J. D. Weinstein and K. G. Libbrecht. Microscopic magnetic traps for neutral atoms. *Phys. Rev. A.*, **52**:4004, 1995.

[9] J. Reichel, W. Hänsel and T. W. Hänsch. Atomic micromanipulation with magnetic surface traps. *Phys. Rev. Lett.*, **83**:3398, 1999.

[10] R. Folman, P. Krüger, D. Cassettari, B. Hessmo, T. Maier and J. Schmiedmayer. Controlling cold atoms using nanofabricated surfaces: Atom chips. *Phys. Rev. Lett.*, **84**:4749, 2000.

[11] W. Hänsel, P. Hommelhoff, T. W. Hänsch and J. Reichel. Bose Einstein condensation on a microelectronic chip. *Nature.*, **413**:498, 2001.

[12] H. Ott, J. Fortagh, G. Schlotterbeck, A Grossmann and C. Zimmermann. Bose Einstein condensation in a surface microtrap. *Phys. Rev. Lett.*, **87**:230401, 2001.

[13] R. Folman, P. Krüger, J. Schmiedmayer, J. Denschlag and C. Henkel. Macroscopic atom optics: From wires to an atom chip. *Adv. At. Mol. Opt. Phys.*, **48**:263–356, 2002.

[14] J. Fortágh and C. Zimmermann. Magnetic microtraps for ultracold atoms. *Rev. Mod. Phys.*, **79**:235–289, 2007.

[15] J. Reichel. Microchip traps and Bose Einstein condensation. *Appl. Phys. B.*, **75**:469–487, 2002.

[16] J. Denschlag, G. Umshaus and J. Schmiedmayer . Probing a singular potential with cold atoms: A neutral atom and a charged wire. *Phys. Rev. Lett.*, **81**:737, 1998.

[17] J. Denschlag, D. Cassettari and J. Schmiedmayer . Guiding neutral atoms with a wire. *Phys. Rev. Lett.*, **82**:2014, 1999.

[18] J. H. Thywissen, M. Olshanii, G. Zabow, M. Drndić, K. S. Johnson, R. M Westervelt and M. Prentiss. Microfabricated magnetic waveguides for neutral atoms. *Eur. Phys. J. D*, **7**:361–367, 1999.

[19] E. A. Hinds, C. J. Vale and M. G. Boshier. Two-wire waveguide and interferometer for cold atoms. *Phys. Rev. Lett.*, **86**:1462, 2001.

[20] P. Horak, B. G. Klappauf, A. Hasse, R. Folman, J. Schmiedmayer, P. Domokos and E. A. Hinds. Possibility of single-atom detection on a chip. *Phys. Rev. A.*, **67**:043806, 2003.

[21] S. Wildermuth, S. Hofferberth, I. Lesanovsky, E. Haller, L. M. Andersson, S. Gröth, I. Bar-Joseph, P. Krüger and J. Schmiedmayer. Microscopic magnetic-field imaging. *Nature*, **435**:440, 2005.

[22] S. Wildermuth, S. Hofferberth, I. Lesanovsky, S. Gröth, P. Krüger, J. Schmiedmayer and I. Bar-Joseph. Sinsing electric and magnetic fields with Bose Einstein condensates. *Appl. Phys. Lett.*, **88**:264103, 2006.

[23] T. Schumm, S. Hofferberth, L. M. Andersson, S. Wildermuth, S. Groth, I. Bar-Joseph, J. Schmiedmayer and P. Krüger. Matter-wave interferometry in a double well on an atom chip. *Nature Physics*, **1**:57, 2005.

[24] S. Hofferberth, I. Lesanovsky, B. Fischer, J. Verdu and J. Schmiedmayer. Radiofrequency-dressed-state potentials for neutral atoms. *Nature Physics*, **2**:710, 2006.

[25] M. P. A. Jones, C. J. Vale, D. Sahagun, B. V. Hall and E. A. Hinds. Spin coupling between cold atoms and the thermal fluctuations of a metal surface. *Phys. Rev. Lett.*, **91**:080401, 2003.

[26] D. M. Harber, J. M. Obrecht, J. M. McGuirk, and E. A. Cornell. Measurement of the Casimir-Polder force through centre-of-mass oscillations of a Bose Einstein condensate. *Phys. Rev. A.*, **72**:033610, 2005.

[27] J. Fortágh, H. Ott, S. Kraft, A. Günther and C. Zimmermann. Surface effects in magnetic microtraps. *Phys. Rev. A.*, **66**:041604(R), 2002.

[28] P. Krüger, L. M. Andersson, S. Wildermuth, S. Hofferberth, E. Haller, S. Aigner, S. Groth, I. Bar-Joseph and J. Schmiedmayer. Potential roughness near lithographically fabricated atom chips. *Phys. Rev. A*, **76**:063621, 2007.

[29] S. Groth, P. Krüger, S. Wildermuth, R. Folman, T. Fernholz, J. Schmiedmayer, D. Mahalu and I. Bar-Joseph. Atoms chips: Fabrication and thermal properties. *Appl. Phys. Lett.*, **85**:2980, 2004.

[30] C. Henkel, S. Pötting and M. Wilkens. Loss and heating of particles in small and noisy traps. *Appl. Phys. B.*, **69**:379–387, 1999.

[31] C. D. J. Sinclair, J. A. Retter, E. A. Curtis, B. V. Hall, I. Llorente Garcia, S Eriksson, B. E. Sauer and E. A Hinds. Cold atoms in videotape micro-traps. *Eur. Phys. J. D.*, **35**:105–110, 2005.

[32] R. Gerritsma, S. Whitlock, T. Fernholz, H. Schlatter, J. A. Luigjes, J.-U. Thiele, J. B. Goedkoop and R. J. C. Spreeuw. Lattice of microtraps for ultracold atoms based on patterned magnetic films. *Phys. Rev. A.*, **76**:033408, 2007.

[33] M. Boyd, E. W. Streed, P. Medley, G. K. Campbell, J. Mun, W. Ketterle and D. E. Pritchard. Atom trapping with a thin magnetic film. *Phys. Rev. A.*, **76**:043624, 2007.

[34] A. Jaakkola, A. Shevchenko, K. Lindfors, M. Hautakorpi, E. Il'yashenko, T. H. Johansen and M. Kaivola. Reconfigurable atom chip on a transparent ferritegarnet film. *Eur. Phys. J. D*, **35**:81, 2005.

[35] J. Y. Wang, S. Whitlock, F. Scharnberg, D. S. Gough, A. I. Sidorov, R. J. McLean and P. Hannaford. Perpendicularly magnetized, grooved GdTbFeCo microstructures for atom optics. *J. Phys. D:Appl. Phys.*, **38**:4015–4020, 2005.

[36] B. V. Hall, S. Whitlock, F. Scharnberg, P. Hannaford and A. I. Sidorov. A permanent magnetic film atom chip for Bose Einstein condensation. *J. Phys. B: At. Mol. Opt. Phys.*, **37**:27 – 36, 2006.

[37] M. Singh, S. Whitlock, R. Anderson, S. Ghanbari, B. V. Hall, M. Volk, A. Akulshin, R. McLean, A. Sidorov and P. Hannaford. Bose-Einstein condensates on magnetic film microstructures. *Laser Spectroscopy: Proceedings of the XVIII*

International Conference, Telluride, USA, 24-29 June, Eds: L. Hollberg and M. Kasevich:228–239, 2008.

[38] M. Singh, M. Volk, A. Akulshin, R. McLean, A. Sidorov and P. Hannaford. One-dimensional lattice of permanent magnetic microtraps for ultracold atoms on an atom chip. *J. Phys. B: At. Mol. Opt. Phys.*, **41**:065301, 2008.

[39] P. Treutlein, P. Hommelhoff, T. Steinmetz, T. W. Hänsch and J. Reichel. Coherence in microchip traps. *Phys. Rev. Lett.*, **92**:203005, 2004.

[40] J. I. Cirac and P. Zoller. A scalable quantum computer with ions in an array of microtraps. *Nature*, **404**:579, 2000.

[41] I. Bloch. Ultracold quantum gases in optical lattices. *Nature Physics*, **1**:23, 2005.

[42] O. Mandel, M. Greiner, A. Widera, T. Rom, T. W. Hänsch and I. Bloch. Coherent transport of neutral atoms in spin-dependent optical lattice potentials. *Phys. Rev. Lett.*, **91**:010407, 2003.

[43] O. Mandel, M. Greiner, A. Widera, T. Rom, T. W. Hänsch and I. Bloch. Controlled collisions for multiparticle entanglement of optically trapped atoms. *Nature*, **425**:937, 2003.

[44] M. Greiner, O. Mandel, T. Esslinger, T. W. Hänsch and I. Bloch . Quantum phase transition from a superfluid to a Mott insulator in a gas of ultracold atoms. *Nature*, **415**:39–44, 2002.

[45] J. Yin, W. Gao, J. Hu and Y. Wang. Magnetic surface microtraps for realizing an array of alkali atomic Bose Einstein condensates or Bose clusters. *Opt. Commun.*, **206**:99–113, 2001.

[46] A. Grabowski and T. Pfau. A lattice of magneto-optical and magnetic traps for cold atoms. *Eur. Phys. J. D.*, **22**:347–354, 2003.

[47] T. M. Roach, H. Abele, M. G. Boshier. H. L. Grossman, K. P. Zetie and E. A. Hinds. Realization of magnetic mirror for cold atoms. *Phys. Rev. Lett.*, **75**:629, 1995.

[48] A. I. Sidorov, R. J. McLean, W. J. Rowlands, D. C. Lau, J. E. Murphy, M. Walkiewicz, G. I. Opat and P. Hannaford. Specular reflection of cold caesium atoms from a magnetostatic mirror. *Quantum Semiclass. Opt.*, **8**:713–725, 1996.

[49] T. Nirrengarten, A. Qarry, C. Roux, A. Emmert, G. Nogues, M. Brune, J.-M. Raimond and S. Haroche. Realization of a superconducting atom chip. *Phys. Rev. Lett.*, **97**:200405, 2006.

[50] T. Mukai, C. Hufnagel, A. Kasper, T. Meno, A. Tsukada, K. Semba and F. Shimizu. Persistent supercurrent atom chip. *Phys. Rev. Lett.*, **98**:260407, 2007.

[51] C. Kittel. *Introduction to Solid State Physics.* John Wiley and Sons Inc., U.S.A., Seventh edition, 1996.

[52] A. S. Sørensen, C. H. van der Wal, L. I. Childress and M. D. Lukin. Capacitive coupling of atomic systems to mesoscopic conductors. *Phys. Rev. Lett.*, **92**:063601, 2004.

[53] A. L. Migdall, J. V. Prodan, W. D. Phillips, T. H. Bergeman and H. J. Metcalf. First observation of magneticaaly trapped neutral atoms. *Phy. Rev. Lett.*, **54**:2596, 1985.

[54] R. V. E. Lovelace, C. Mahanian, T. J. Tommila and D. M. Lee. Magnetic confinement of a neutral gas. *Nature*, **318**:30, 1985.

[55] D. E. Pritchard. Cooling neutral atoms in a magnetic trap for precision spectroscopy. *Phys. Rev. Lett.*, **51**:1336, 1983.

[56] C. V. Sukumar and D. M. Brink. Spin flip transition in a magnetic trap. *Phys. Rev. A.*, **56**:2451, 1997.

[57] J. Söding, D. Guéry-Odelin, P. Desbiolles, G. Ferrari and J. Dalibard. Giant spin relaxation of ultracold cesium gas. *Phys. Rev. Lett.*, **80**:1869, 1998.

[58] P. S. Julienne, F. H. Mies, E. Tiesinga and C. J. Williams. Collisional stability of double Bose gas. *Phys. Rev. Lett.*, **78**:1880, 1997.

[59] J. M. Gerton, C. A. Sackett, B. J. Frew and R. G. Hulet. Dipolar relaxation collisions in magnetically trapped ^{7}Li. *Phys. Rev. A.*, **59**:1514, 1999.

[60] J. P. Burke, Jr, J. L. Bohn, B. D. Esry and C. H. Greene. Impact of the ^{87}Rb singlet scattering length on suppressing inelastic collisions. *Phys. Rev. A.*, **55**:R2511, 1997.

[61] E. Timmermans and R. Cote. Superfluidity in sympathetic cooling with atomic Bose Einstein condensates. *Phys. Rev. Lett.*, **80**:3419, 1998.

[62] E. A. Burt, R. W. Ghrist, C. J. Myatt, M. J. Holland, E. A. Cornell and C. E. Wieman. Coherence, correlations, and collisions: What one learns about Bose Einstein condensates from their decay. *Phys. Rev. Lett.*, **79**:337, 1997.

[63] P. O. Fedichev, M. W. Reynolds and G. V. Shlyapnikov. Three body-recombination of ultracold atoms in a weakly bound s level. *Phys. Rev. Lett.*, **77**:2921, 1996.

[64] A. J. Moerdijk, H. M. J. M. Boesten and B. J. Verhaar. Decay of trapped ultracold alkali atoms by recombination. *Phys. Rev. A.*, **53**:916, 1996.

[65] A. J. Moerdijk and B. J. Verhaar. Collisional two- and three-body decay rates of dilute quantum gases at ultracold temperatures. *Phys. Rev. A.*, **53**:R19, 1996.

[66] J. Söding, D. Guéry-Odelin, P. Desbiolles, F. Chevy, H. Inamori and J. Dalibard. Three-body decay of a rubidium Bose Einstein condensate. *Appl. Phys. B.*, **69**:257–261, 1999.

[67] C. Henkel and S. Pötting. Coherent transport of matter waves. *Appl. Phys. B.*, **72**:73–80, 2001.

[68] M. E. Gehm, K. M. O'Hara, T. A Savard and J. E. Thomas. Dynamics of noise-induced heating in atom traps. *Phys. Rev. A.*, **58**:3914, 1998.

[69] R Jáuregui. Nonperturbative and perturbative treatments of parametric heating in atom traps. *Phys. Rev. A.*, **64**:053408, 2001.

[70] T. A. Savard, K. M. O'Hara and J. E. Thomas. Laser-noise-induced heating in far-off resonance optical traps. *Phys. Rev. A.*, **56**:R1095, 1997.

[71] S. Whitlock. Bose Einstein condensates on a magnetic film atom chip. *PhD thesis*, Swinburne University of Technology, Melbourne, 2007.

[72] A. Günther, M. Kemmler, S. Kraft, C. J. Vale, C. Zimmermann and J. Fortágh. Combined chips for atom optics. *Phys. Rev. A.*, **71**:063619, 2005.

[73] S. Ghanbari, T. D. Kieu, A. Sidorov and P. Hannaford. Permanent magnetic lattices for ultracold atoms and quantum degenerate gases. *J. Phys. B: At. Mol. Opt. Phys.*, **39**:847–860, 2006.

[74] A. I. Sidorov, D. C. Lau, G. I. Opat, R. J. McLean, W. J. Rowlands and P. Hannaford. Magnetostatic optical elements for laser cooled atoms. *Laser Physics*, **8**:642, 1998.

[75] D. C. Lau, R. J. McLean, A. I. Sidorov, D. S. Gough, J. Koperski, W. J. Rowlands, B. A. Sexton, G. I. Opat and P. Hannaford. Magnetic mirrors with micron scale periodicities for slowly moving neutral atoms. *J. Phys. B: Quantum Semiclass Opt*, **1**:371–377, 1999.

[76] F. Dalfovo, S. Giorgini, L. P. Pitaevskii and S. Stringari. Theory of Bose Einstein condensation in trapped gases. *Rev. Mod. Phys.*, **71**:463–512, 1999.

[77] C. J. Pethick and H. Smith. *Bose Einstein Condensation in Dilute Gases.* Cambridge University Press, Cambridge, U.K, 2002.

[78] L. Pitaevskii and S. Stringari. *Bose Einstein Condensation.* Oxford University Press Inc., Oxford, U.K, 2004.

[79] D. J. Griffiths. *Introduction to Electrodynamics.* Pearson Education. Pty. Ltd, Singapore, 2004.

[80] J. D. Jackson. *Classical Electrodynamics.* John Wiley and Sons, Inc, New York, 2004.

[81] B. Cullity. *Introduction to Magnetic Materials.* Addison-Wesley Publishing Company, Inc, Philipines, 1972.

[82] R. S. Tebble and D. J. Claik. *Magnetic Materials.* John Wiley and Sons, Inc, New York.

[83] S. Tsunashima. Magneto-optical recording. *J. Phys. D:Appl. Phys.*, **34**:R87–R102, 2001.

[84] R. J. Gambino and T. Suzuki. *Magneto-Optical Recording Materials.* IEEE Press, New York, 2000.

[85] M. Mansuripur. *The Physical Principles of Magneto-Optical Recording.* Cambridge University Press, U.K., 1995.

[86] I. Barb, R. Gerritsma, Y. T. Xing, J. B. Geodkoop and R. J. C. Spreeuw. Creating Ioffe-Pritchard micro-traps from permanent magnetic film with in-plane magnetization. *Eur. Phys. J. D.*, **35**:75–79, 2005.

[87] J. J. Tollett, C. C. Bradley, C. A. Sackett, R. G. Hulet. Permanent magnetic trap for cold atoms. *Phys. Rev. A.*, **51**:R22, 2006.

[88] T. Fernholz, R. Gerritsma, S. Whitlock, I. Barb and R. J. C. Spreeuw. Fully permanent magnet atom chips for Bose-Einstein condensation. *Phys. Rev. A.*, **77**:033409, 2008.

[89] J. Clarke and A. I. Braginski (*Eds*). *The SQUID Handbook: Vol-I Fundamentals and Technology of SQUIDs and SQUID Systems.* Wiley-VCH, betz-druck GmbH, Darmstadt, 2004.

[90] J. Clarke and A. I. Braginski (*Eds*). *The SQUID Handbook: Vol-II Fundamentals and Technology of SQUIDs and SQUID Systems.* Wiley-VCH, betz-druck GmbH, Darmstadt, 2004.

[91] J. F. O'Hanlon. *A User's Guide to Vacuum Technology.* John Wiley and Sons, Inc., Hoboken, New Jersey, 2003.

[92] L. Ricci, M. Weidemüller, T. Esslinger, A. Hemmerich, C. Zimmermann, V. Vuletic, W. König and T. W. Hänsch. A compact grating-stabilized diode laser system for atomic physics. *Opt. Commun.*, **117**:541–549, 1995.

[93] C. Wieman and T. W. Hänsch. Doppler-free laser polarization spectroscopy. *Phys. Rev. Lett.*, **36**:1170, 1976.

[94] M. L. Harris, C. S. Adams, S. L. Cornish, I. C. McLeod, E. Tarleton and I. G. Hughes. Polarization spectroscopy in rubidium and cesium. *Phys. Rev. A.*, **73**:062509, 2006.

[95] C. P. Pearman C. S. Adams, S. G. Cox, P. F. Griffin, D. A. Smith and I. G. Hughes. Polarization spectroscopy of a closed atomic transition: applications to laser frequency locking. *J. Phys. B: At. Mol. Phys.*, **35**:5141, 2002.

[96] C. Foot. *Atomic Physics.* Oxford University Press Inc, Oxford, UK, 2005.

[97] W. Ketterle, D. S. Durfee and D. M. Stamper-Kurn. Making, probing and understanding Bose Einstein condensates. *arXiv:cond-mat/9904034.*, 5 Apr 1999.

[98] A. Haase, D. Cassettari, B. Hessmo and J. Schmiedmayer. Trapping neutral atoms with wires. *Phys. Rev. A.*, **64**:043405, 2001.

[99] P. W. H. Pinkse, A. Mosk, M. Weidemüller, M. W. Reynolds, T. W. Hijmans and J. T. M. Walraven. Adiabatically changing the phase space density of a trapped Bose gas. *Phys. Rev. Lett.*, **78**:990, 1997.

[100] D. M. Stamper-Kurn, H.-J. Miesner, A. P. Chikkatur, S. Inouye, J. Stenger and W. Ketterle. Reversible formation of a Bose Einstein condensate. *Phys. Rev. Lett.*, **81**:2194, 1998.

[101] H. F. Hess. Evaporative cooling of magnetically trapped and compressed spin-polarized hydrogen. *Phys. Rev. B.*, **34**:3476, 1986.

[102] H. F. Hess, G. P. Kochanski, J. M. Doyle, N. Masuhara, D. Kleppner and T. J. Greytak. Magnetic trapping of spin-polarized atomic hydrogen. *Phys. Rev. Lett.*, **59**:672, 1987.

[103] K. B. Davis, M.-O. Mewes, M. A. Joffe, M. R. Andrews and W. Ketterle. Evaporative cooling of sodium atoms. *Phys. Rev. Lett.*, **74**:5202, 1995.

[104] K. B. Davis, M.-O. Mewes and W. Ketterle. An analytical model for the evaporative cooling of atoms. *Appl. Phys. B.*, **60**:155, 1995.

[105] O. J. Luiten, M. W. Reynolds and J. T. M. Walraven. Kinetic theory of the evaporative cooling of a trapped gas. *Phys. Rev. A.*, **53**:381, 1996.

[106] W. Ketterle and N. J. Van Druten. Evaporative cooling of trapped atoms. *Adv. At. Mol. Opt. Phys.*, **37**:181–236, 1996.

[107] J. R. Rubbmark, M. M. Kash, M. G. Littman and D. Kleppner. Dynamical effects at avoided level crossing: A study of the Landau-Zener effect using Rydberg atoms. *Phys. Rev. A.*, **23**:3107, 1981.

[108] C. A. Sackett, C. C. Bradley and R. G. Hulet. Optimization of evaporative cooling. *Phys. Rev. A.*, **55**:3797, 1996.

[109] J. P. Burke, J. L. Bohn, B. D. Esry and C. H. Greene. Prospects for mixed-isotope Bose Einstein condensates in rubidium. *Phys. Rev. Lett.*, **80**:2097, 1998.

[110] M. Arndt, M. Ben Dahan, D. Guery-Odelin, M. W. Reynolds and J. Dalibard. Observation of zero energy resonances in Cs-Cs collisions. *Phys. Rev. Lett.*, **79**:625, 1997.

[111] G. I. Opat, S. J. Wark and A. Cimmino. Electric and magnetic mirros and gratings for slowly moving neutral atoms and molecules. *Appl. Phys. B.*, **54**:396–402, 1992.

[112] C. V. Saba, P. A. Barton, M. G. Boshier, I. G. Hughes, P. Rosenbusch, B. E. Sauer and E. A. Hinds. Reconstruction of a cold atom cloud by magnetic focusing. *Phys. Rev. Lett.*, **82**:468, 1999.

[113] P. Rosenbusch, B. V. Hall, G. Hughes, C. V. Saba and E. A. Hinds. Manipulation of cold atoms using a corrugated magnetic reflector. *Phys. Rev. A.*, **61**:031404(R), 2000.

[114] Y. Colombe, B. Mercier, H. Perrin and V. Lorent. Diffraction of a Bose Einstein condensate in the time domain. *Phys. Rev. A.*, **72**:061601(R), 2005.

[115] P. Szriftgiser, D Guéry-Odelin, M. Arndt and J. Dalibard. Atomic wave diffraction and interference using temporal slits. *Phys. Rev. Lett.*, **77**:4, 1996.

[116] H. Perrin, Y. Colombe, B. Mercier, V. Lorent and C. Henkel. Diffuse reflection of a Bose Einstein condensate from a rough evanescent wave mirror. *J. Phys. B: At. Mol. Opt. Phys.*, **39**:4649–4658, 2006.

[117] A. Günther, S. Kraft, M. Kemmler, D. Koelle, R. Kleiner, C. Zimmermann and F. Fortágh. Diffraction of a Bose Einstein condensate from a magnetic lattice on a microchip. *Phys. Rev. Lett.*, **95**:170405, 2005.

[118] A. Günther, S. Kraft, C. Zimmermann and F. Fortágh. Atom interferrometer based on phase coherent splitting of Bose Einstein condensates with an integrated magnetic grating. *Phys. Rev. Lett.*, **98**:140403, 2007.

[119] Yu. B. Ovchinnikov, J. H. Muller, M. R. Doery, E. J. D. Vredenbregt, K. Helmerson, S. L. Rolston and W. D. Phillips. Diffraction of a released Bose Einstein condensate by a pulsed standing light wave. *Phys. Rev. Lett.*, **83**:284, 1999.

[120] A. Görlitz, J. M. Vogels, A. E. Leanhardt, C. Raman, T. L. Gustavson, J. R. Abo-Shaeer, A. P. Chikkatur, S. Gupta, S. Inouye, T. Rosenband and W. Ketterle.

Realization of Bose Einstein condensates in lower dimensions. *Phys. Rev. Lett.*, **87**:130402, 2001.

[121] V. A. Yurovsky, M. Olshanii and D. S. Weiss. Collisions, correlations and integrability in atomic waveguides. *Adv. At. Mol. Opt. Phys.*, **55**:61 – 138, 2008.

[122] P. Treutlein, T. W. Hänsch, J. Reichel, A. Negretti, M. A. Cirone and T. Calarco. Microwave potentials and optimal control for robust quantum gates on an atom chip. *Phys. Rev. A.*, **74**:022312, 2006.

[123] Y. Makhlin, G. Schön and A. Shnirman. Quantum-state engineering with Josephson-junction devices. *Rev. Mod. Phys.*, **73**:357, 2001.

[124] J. E. Mooij, T. P. Orlando, L. Levitov, L. Tian, C. H. van der Wal and S. Lloyd. Josephson persistent current qubit. *Science*, **285**:1036, 1999.

[125] J. R. Friedman, V. Patel, W. Chen, S. K. Tolpygo, and J. E. Lukens. Quantum superposition of distinct macroscopic states. *Nature*, **406**:43, 2000.

[126] C. H. van der Wal, A. C. J. ter Haar, F. K. Wilhelm, R. N. Schouten, C. J. P. M. Harmans, T. P. Orlando, S. Lloyd, and J. E. Mooij. Quantum superposition of macroscopic persistent current states. *Science*, **290**:773, 2000.

[127] I. Chiorescu, Y. Nakamura, C. J. P. M. Harmans and J. E. Mooij. Coherent quantum dynamics of a superconducting flux qubit. *Science*, **299**:1869, 2003.

[128] A. D. Armour, M. P. Blencowe and K. C. Schwab. Entanglement and decoherence of a micromechanical resonator via coupling to a Cooper pair box. *Phys. Rev. Lett.*, **88**:148301, 2002.

[129] P. Treutlein, D. Hunger, S. Camerer, T. W. Hänsch and J. Reichel. A Bose Einstein condensate coupled to a nanomechanical resonator on an atom chip. *Phys. Rev. Lett.*, **99**:140403, 2007.

[130] E. Schrödinger. Die gegenwartige situation in der quantenmechanik. *Naturwissenschaften*, **23**:807, 1935.

[131] S. Haroche and J-M. Raimond. *Exploring the Quantum*. Oxford University Press Inc., New York, 2006.

[132] A. Einstein, B. Podolsky and N. Rosen. Can quantum-mechanical description of physical reality be considered complete. *Phys. Rev.*, **47**:777, 1935.

[133] M. A. Nielsen and I. L. Chuang. *Quantum Information and Quantum Computation*. Cambridge University Press, U.K, 2002.

[134] W. H. Zurek. Decoherence, einselection, and the quantum origins of the classical. *Revs. Mod. Phys.*, **75**:715–775, 2003.

[135] M. Schlosshauer. Decoherence, the measurement problem and the interpretations of quantum mechanics. *Revs. Mod. Phys.*, **76**:1267–1305, 2004.

[136] M. Namiki, S. Pascazio and H. Nakazato. *Decoherence and Quantum Measurements*. World Scientific Publishing Co. Pty. Ltd, Singapore, 1999.

[137] Y. Colombe, T. Steinmetz, G. Dubois, F. Linke, D. Hunger and J. Reichel. Strong atom-field coupling for Bose-Einstein condensates in an optical cavity on an atom chip. *Nature*, **450**:272, 2007.

[138] F. Brennecke, T. Donner, S. Ritter, T. Bourdel, M. Köhl and T. Esslinger. Cavity QED with a Bose Einstein condensate. *Nature*, **450**:260, 2007.

[139] F. Brennecke, S. Ritter, T. Donner, T. Esslinger. Cavity opto-mechanics with a Bose Einstein condensate. *arXiv:0807.2347 [quant-ph]*, 2008.

[140] W. Marshall, C. Simon, R. Penrose and D. Bouwnmeester. Towards quantum superposition of a mirror. *Phys. Rev. Lett.*, **91**:130401, 2003.

[141] S. Gigan, H. R. Böhm, M. Paternostro, F. Blaser, G. Langer, J. B. Hertzberg, K. C. Schwab, D. Bäuerle. M. Aspelmeyer and A Zeilinger. Self cooling of a micromirror by radiation pressure. *Nature*, **444**:67–70, 2006.

[142] R. P. Feynmann, R. B. Leighton and M. Sands. *Lectures on Physics Vol-III.* Addison-Wesley Publishing Company, Reading, Massachusetts, USA, Third printing edition, 1966.

[143] J. C. Gallop. *SQUIDS, the Josephson Effects and Superconducting Electronics.* IOP Publishing Limited, Adam Hilger., Bristol, Philadelphia and New York, 1990.

[144] Y. Shin, M. Saba, T. A. Pasquini, W. Ketterle, D. E. Pritchard and A. E. Leanhardt. Atom interferrometry with Bose Einstein condensates in a double well potential. *Phys. Rev. Lett.*, **92**:050405, 2004.

[145] M. O. Scully and K. Drühl. Quantum eraser: A proposed photon correlation experiment concerning observation and "delayed choice" in quantum mechanics. *Phys. Rev. A.*, **25**:2208, 1982.

[146] M. O. Scully and M. S. Zubairy. *Quantum Optics.* Cambridge University Press, U.K, 2002.

[147] R. Bach and K. Rzążewski. Correlations in atomic systems: Diagnosing coherent superpositions. *Phys. Rev. Lett.*, **92**:200401, 2004.

[148] P. Walther, J.-W. Pan, M. Aspelmeyer, R. Ursin, S. Gasparoni and A. Zeilinger. De Broglie wavelength of a non-local four-photon Fock state. *Nature*, **429**:158, 2008.

[149] M. W. Mitchell, J. S. Lundeen and A. M. Steinberg. Super-resolving phase measurements with a multiphoton entangled state. *Nature*, **429**:161, 2004.

[150] K. Mølmer and A. Sørensen. Multiparticle entanglement of hot trapped ions. *Phys. Rev. Lett.*, **82**:1835, 1999.

[151] C. A Sackett, D. Kielpinski, B. E. King, C. Langer, V. Meyer, C. J. Myatt, M. Rowe, Q.A. Turchette, W. M. Itano, D.J. Wineland and C. Monroe. Experimental entanglement of four particles. *Nature*, **404**:256, 2000.

[152] C. H. van der Wal, F. K. Wilhelm, C. J. P. M Harmans and J. E. Mooij. Engineering decoherence in Josephson persistent-current qubits. *Eur. Phys. J. B.*, **31**:111, 2003.

[153] J. Q. You and F. Nori. Superconducting circuits and quantum information. *Physics Today*, **42**:November, 2005.

[154] C. Roux, M. Emmert, A. Lupascu, T. Nirrengarten, G. Nogues, M. Brune, J.-M. Raimond and S. Haroche. Bose Einstein condensation on a superconducting atom chip. *Eur. Phys. Lett.*, **81**:56004, 2008.

[155] S. Ghanbari. Superfluid to Mott insulator quantum phase transition in permanent magnetic lattices. *PhD thesis*, Swinburne University of Technology, Melbourne, 2008.

Author's Publications

Book Chapters

- M. Singh, S. Whitlock, R. Anderson, S. Ghanbari, B. V. Hall, M. Volk, A. Akulshin, R. McLean, A. Sidorov and P. Hannaford., Bose Einstein condensates on magnetic film microstructures. *Laser Spectroscopy: Proceedings of the XVIII International Conference, Telluride, USA, 24-29 June*, Eds: L. Hollberg, J. Bergquist and M. Kasevich, 228-239, 2008.

Journal Articles

- M. Singh, M. Volk, A. Akulshin, R. McLean, A. Sidorov and P. Hannaford., One-dimensional lattice of permanent magnetic microtraps for ultracold atoms on an atom chip. *J. Phys. B: At. Mol. Opt. Phys.*, **41**: 065301, 2008.
- Mandip Singh., Macroscopic entanglement between a Bose Einstein condensate and a superconducting loop. *Optics Express* **17**:2600, 2009.
- M. Singh, R. McLean, A. Sidorov, P. Hannaford., Dynamics of reflection of ultracold atoms from a periodic one-dimensional magnetic lattice potential. *Phys. Rev. A* **79**:1, 2009.
- A. Akulshin, M. Singh, A. Sidorov, P. Hannaford., Broadband steep atomic dispersion induced velocity-selective optical pumping. *Optics Express* **16**:15463,

2008.