

Curriculum Vitae of Simon Alexander Gardiner BA MSc (Waikato) Dr rer nat (Innsbruck)

Dated September 9, 2004

<http://bdagger.colorado.edu/~sgardin/>

University Education

28/01/2000: Graduated *Doktor der Naturwissenschaften* (Dr rer nat, equivalent to PhD) with the top grade of sehr gut, mit Auszeichnung (very good, with distinction), majoring in Physics, at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck, Innsbruck, Austria, within the group of Prof P. Zoller and Prof J.I. Cirac, submitting the Dissertation *Quantum Measurement, Quantum Chaos, and Bose-Einstein Condensates*.

15/04/1996: Graduated *Master of Science* (MSc) with first class honours, majoring in Physics, at the University of Waikato, Hamilton, New Zealand.

01/03/1995–30/10/1995: MSc Thesis *Theory and Application of Dark States in Cavity QED* undertaken at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck within the group of Prof P. Zoller.

10/04/1994: Graduated *Bachelor of Arts* (BA), majoring in Mathematics, at the University of Waikato.

10/04/1992: Graduated *Bachelor of Science* (BSc), majoring in Biology and Chemistry, at the University of Waikato.

Employment Record

01/12/2003–present: Post-doc at JILA, University of Colorado and National Institute of Standards and Technology, Boulder, Colorado, within the group of Prof M. Holland and Prof J. Cooper.

04/02/2002–30/11/2003: Post-doc at the Department of Atomic and Laser Physics, University of Oxford, Oxford, United Kingdom, within the group of Prof K. Burnett. During the 2002–2003 academic year tutored second-year quantum mechanics at St. Peters College, Oxford.

01/12/2000–30/11/2001: Fellowship awarded by the Alexander von Humboldt Foundation, undertaken at the Universität Potsdam, Potsdam, Germany, within the group of Prof M. Wilkens, and at the Universität Hannover, Hannover, Germany, within the group of Prof M. Lewenstein.

01/06/2000–30/11/2000: Fellowship awarded by the European Science Foundation, within the framework of the network BEC2000+, undertaken at the Universität Potsdam, within the group of Prof M. Wilkens.

01/02/2000–31/05/2000: Post-doc at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck, Innsbruck, Austria, within the group of Prof P. Zoller and Prof J.I. Cirac.

01/10/1999–31/01/2000: Forschungsassistent (research assistant) at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck, within the group of Prof P. Zoller and Prof J.I. Cirac.

01/10/1996–30/09/1999: Vertragsassistent (junior lecturer) at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck. Teaching duties were the supervision of Übungen (weekly problem solving sessions held separately from lectures), the marking of test papers and the grading of students, at various times for the following subjects:

Winter 1996: Thermodynamics and Statistical Mechanics

Summer 1997: Classical Mechanics

Winter 1997: Quantum Mechanics II

Summer 1998: Mathematical Methods of Physics II

Quantum mechanics I

Quantum Mechanics III (Quantum Information Theory)

Winter 1998: Quantum Mechanics I

Summer 1999: Electrodynamics

01/07/1995–30/09/1996: Forschungsassistent (research assistant) at the Institut für Theoretische Physik, Leopold-Franzens-Universität Innsbruck, within the group of Prof P. Zoller.

01/03/1995–30/06/1995: Scholarship awarded by the Österreichische Akademische Austauschdienst (Austrian Academic Exchange Service), undertaken at the Leopold-Franzens-Universität Innsbruck, within the group of Prof P. Zoller.

Publications

Journal Papers

S.A. Morgan and S.A. Gardiner, *Extension of the Castin-Dum number conserving approach to finite temperature*, in preparation.

R. Bach, M.B. d’Arcy, S.A. Gardiner, and K. Burnett, *Quantum mechanical cumulant dynamics near stable periodic orbits in phase space*, e-print physics/0310143, to be submitted to Phys. Rev. E.

A. Buchleitner, K. Burnett, M.B. d’Arcy, S. Fishman, S.A. Gardiner, I. Guarneri, Z.Y. Ma, L. Rebuzzini, and G.S. Summy, *Nonlinear quantum resonances: from experiments to number theory*, submitted to Science.

Z.Y. Ma, M.B. d’Arcy, and S.A. Gardiner, *Gravity-sensitive quantum dynamics in cold atoms*, e-print physics/0311045, accepted by Phys. Rev. Lett.

K. Góral, T. Köhler, S.A. Gardiner, E. Tiesinga, and P.S. Julienne, *Adiabatic association of ultracold molecules via magnetic field tunable interactions*, J. Phys. B. **37**, 3457–3500 (2004).

C. Henkel and S.A. Gardiner, *Spatial decoherence of Bose-Einstein condensates in microtraps*, Phys. Rev. A **69**, 043602-[1–5] (2004).

S. Schlunk, M.B. d’Arcy, S.A. Gardiner, and G.S. Summy, *Observation of high-order quantum accelerator modes*, Phys. Rev. Lett. **90**, 124102-[1–4] (2003).

S. Schlunk, M.B. d’Arcy, S.A. Gardiner, D. Cassettari, R.M. Godun, and G.S. Summy, *Signatures of quantum stability in a classically chaotic system*, Phys. Rev. Lett. **90**, 054101-[1-4] (2003).

A.P. Albus, S.A. Gardiner, F. Illuminati, and M. Wilkens, *Quantum field theory of dilute homogeneous Bose-Fermi mixtures at zero temperature: general formalism and beyond mean-field corrections*, Phys. Rev. A **65**, 056307-[1–15] (2002).

M.B. d’Arcy, R.M. Godun, M.K. Oberthaler, G.S. Summy, K. Burnett, and S.A. Gardiner, *Approaching classicality in quantum accelerator modes through decoherence*, Phys. Rev. E **64**, 056233-[1–15] (2001).

D. Jaksch, S.A. Gardiner, K. Schulze, J.I. Cirac, and P. Zoller, *Uniting Bose-Einstein condensates in optical resonators*, Phys. Rev. Lett. **86**, 4733–4736 (2001).

S.A. Gardiner, K.M. Gheri, and P. Zoller, *Cavity assisted quasiparticle damping in a Bose-Einstein condensate*, Phys. Rev. A **63**, 051603(R)-[1–4] (2001).

S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, and P. Zoller, *Nonlinear matter wave dynamics with a chaotic potential*, Phys. Rev. A **62**, 023612-[1–21] (2000).

S.A. Gardiner, J.I. Cirac, and P. Zoller, *Quantum chaos in an ion trap: the delta-kicked harmonic oscillator*, Phys. Rev. Lett. **79**, 4790–4793 (1997); erratum, Phys. Rev. Lett. **80**, 2968 (1998).

S.A. Gardiner, J.I. Cirac, and P. Zoller, *Non-classical states and measurement of general motional observables of a trapped ion*, Phys. Rev. A, **55**, 1683–1694 (1997).

T. Pellizzari, S.A. Gardiner, J.I. Cirac, and P. Zoller, *Decoherence, continuous observation and quantum computing: a cavity QED model*, Phys. Rev. Lett. **75**, 3788–3791 (1995) (cited over 200 times).

Special Issues

C. Henkel, S.A. Gardiner, and A. Negretti, *(De)coherence physics with condensates in microtraps*, Special issue: Proceedings of the twelfth international laser physics workshop (LPHYS’03), Laser Physics **14**, 615–620 (2004).

S.A. Gardiner, *(Quantum) chaos in Bose-Einstein condensates*, Special issue: Quantum challenges 2001, edited by M. Lewenstein, J. Mod. Optics **49**, 1971-1977 (2002).

Conference proceedings

J.F. Poyatos, S.A. Gardiner, R. Walser, J.I. Cirac, P. Zoller, and R. Blatt, *Quantum engineering with trapped ions*, New developments on fundamental problems in quantum physics, edited by M. Ferrero and A. van der Merwe (Kluwer Academic Publishers, Dordrecht NL 1997).

J.I. Cirac, S.A. Gardiner, T. Pellizzari, J.F. Poyatos, and P. Zoller, *Synthesis of entangled states and quantum computing*, Atomic physics 15, 16–30, edited by H.B. van Linden van den Heuvell, J.T.M. Walraven, and M.W. Reynolds, (World Scientific, Singapore 1997).

T. Pellizzari, S.A. Gardiner, J.I. Cirac, and P. Zoller, *Synthesis of entangled quantum states and quantum computation*, Coherence and quantum optics VII, 35–44, edited by J. Eberly, L. Mandel, and E. Wolf (Plenum, New York NY 1996).

Theses

S.A. Gardiner, *Quantum measurement, quantum chaos, and Bose-Einstein condensates*, Doctoral dissertation, 209 pages (Leopold-Franzens-Universität Innsbruck, Innsbruck AT 2000).

S.A. Gardiner, *Theory and application of dark states in cavity QED*, Master of Science thesis, 123 pages (University of Waikato, Hamilton NZ 1996).

Conference Presentations

09/08/2004–13/08/2004: QUEST (Quantum Enabled Science and Technology) workshop, in Santa Fe, New Mexico. Invited talk: *Atom optical quantum resonance dynamics with gravity* (S.A. Gardiner, R. Bach, A. Buchleitner, K. Burnett, Z.Y. Ma, M.B. d’Arcy, S. Fishman, I. Guarneri, L. Rebuzzini, S. Schlunk, G.S. Summy).

25/04/2004–29/04/2004: DAMOP (American Physical Society Division of Atomic, Molecular, and Optical Physics) meeting, in Tucson, Arizona. Talk: *Cumulant dynamics of quantum accelerator modes* (S.A. Gardiner, R. Bach, M.B. d’Arcy, K. Burnett).

16/02/2004–17/02/2004: Classical and quantum field day in Dunedin, New Zealand. Invited talk: *Adiabatic association of ultracold molecules via magnetic field tunable interactions* (S.A. Gardiner, K. Góral, P.S. Julienne, T. Köhler, E. Tiesinga).

01/05/2003: Conference on semiconductor microstructures and atom traps in London, UK. Poster: *Quantum hydrodynamics with Wigner operators* (S.A. Gardiner, K. Burnett).

23/02/2003–01/03/2003: Fundamentals of quantum optics VI, in Obergurgl, Austria. Poster: *Quantum accelerator modes in an atom-optical system* (S. Schlunk, M.B. d’Arcy, S.A. Gardiner, D. Cassettari, R.M. Godun, G.S. Summy).

28/09/2002–02/10/2002: 7th workshop on atom optics and interferometry in Lunteren, the Netherlands. Poster: *Wigner operator and cumulant hydrodynamic formulation of BEC and superfluid dynamics* (S.A. Gardiner).

15/09/2001–20/09/2001: European research conference on Bose-Einstein condensation, in San Feliu de Guixols, Spain. Posters: *Cavity assisted quasiparticle damping in a BEC* (S.A. Gardiner, K.M. Gheri, P. Zoller) and *Mixtures of bosons and fermions* (A.P. Albus, S.A. Gardiner, F. Illuminati, M. Wilkens).

06/09/2001–08/09/2001: Quantum challenges symposium, celebrating the 60th birthday of Prof. F. Haake, in Essen, Germany. Invited talk: *(Quantum) chaos in BEC* (S.A. Gardiner).

26/06/2001–02/07/2001: ICONO XVII (International Conference on Coherent and Nonlinear Optics), in Minsk, Belarus. Invited talk: *Cavity assisted quasiparticle damping in a BEC* (S.A. Gardiner, K.M. Gheri, P. Zoller).

20/06/2001–26/06/2001: Quantum optics V, in Koscielisko, Poland. Posters: *Cavity assisted quasiparticle damping in a BEC* (S.A. Gardiner, K.M. Gheri, P. Zoller) and *Investigating cold atoms in a pulsed standing wave of laser light* (M.B. d’Arcy, R.M. Godun, D. Cassettari, S.A. Gardiner, G.S. Summy, K. Burnett).

03/06/2001–05/06/2001: First international workshop on theory of quantum gases and quantum coherence, in Salerno, Italy. Invited talk: *Controlled dissipative BEC dynamics via a lossy optical cavity* (S.A. Gardiner, K.M. Gheri, P. Zoller).

02/04/2001–06/04/2001: ECAMP VII (European Conference on Atomic and Molecular Physics) in Berlin, Germany. Poster: *Decohering condensates* (C. Henkel, S.A. Gardiner).

18/09/2000–21/09/2000: WE-Heraeus seminar on driven quantum systems, in Tutzing, Germany. Invited talk: *Dynamics of a driven BEC and the influence of chaos* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).

17/07/2000–25/07/2000: Euroschool on Bose-Einstein condensates and atom-lasers, in Cargèse, Corsica. Poster: *Non-linear matter wave dynamics with a chaotic potential* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).

- 01/05/2000–24/05/2000: Workshop on Bose-Einstein condensation, in Leiden, the Netherlands. Talk: *Dynamics of a driven BEC* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).
- 07/06/1999–11/06/1999: ICOLS XIV (International Conference on Laser Spectroscopy), in Innsbruck, Austria. Poster: *Quantum chaos, nonlinearity, and BEC* (S.A. Gardiner, D. Jaksch, J.I. Cirac, P. Zoller).
- 14/04/1998–18/04/1998: YAO IV (Young Atom Opticians), in Gif-sur-Yvette, France. Talk: *Quantum chaos in a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 23/03/1998–25/03/1998: DPG (German Physical Society) meeting in Konstanz, Germany. Talk: *Quantum chaos in a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 12/01/1997–17/01/1997: Fundamentals of quantum optics IV, in Kühtai, Austria. Poster: *Measurement of an arbitrary motional observable of a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 09/09/1996–12/09/1996: WE-Heraeus seminar on quantum chaos, in Günzburg, Germany. Poster: *Measurement of an arbitrary motional observable of a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 18/09/1995–22/09/1995: ÖPG (Austrian Physical Society) meeting in Leoben, Austria. Talk: *A quantum computer in cavity QED* (T. Pellizzari, S.A. Gardiner, J.I. Cirac, P. Zoller).

Time Spent and Seminars Given at Other Institutions

- 03/03/2004: Seminar at the University of Auckland: *Cumulant analysis of quantum accelerator modes in atom optics* (S.A. Gardiner, R. Bach, K. Burnett, M.B. d’Arcy, S. Schlunk, D. Cassettari, R.M. Godun, G.S. Summy).
- 13/08/2003: Seminar at the University of Nottingham: *Quantum accelerator modes in atom optics: ϵ -classics and semiclassical* (R. Bach, K. Burnett, D. Cassettari, M.B. d’Arcy, R.M. Godun, S. Schlunk, G.S. Summy, S.A. Gardiner).
- 25/06/2003–30/06/2003: Visit to NIST (National Institute of Standards and Technology) Gaithersburg, as the guest of Dr C. Williams. Seminar: *Quantum accelerator modes in atom optics: ϵ -classics and semiclassical* (R. Bach, K. Burnett, D. Cassettari, M.B. d’Arcy, R.M. Godun, S. Schlunk, G.S. Summy, S.A. Gardiner).
- 27/05/2003–06/06/2003: Visit to LANL (Los Alamos National Laboratory) as the guest of Dr D.A. Steck. Seminar: *Quantum accelerator modes in atom optics: ϵ -classics and semiclassical* (R. Bach, K. Burnett, D. Cassettari, M.B. d’Arcy, R.M. Godun, S. Schlunk, G.S. Summy, S.A. Gardiner).
- 06/05/2003–09/05/2003: Visit to the Universität Basel as the guest of Prof C. Bruder. Seminar: *Quantum accelerator modes in atom optics: observation, stability, and applications* (R. Bach, D. Cassettari, M.B. d’Arcy, R.M. Godun, S. Schlunk, K. Burnett, G.S. Summy, S.A. Gardiner).
- 26/11/2002: Seminar at the ETH (Eidgenössische Technische Hochschule) Zürich: *Quantum accelerator modes in atom optics: experiment, interpretation, and theory* (D. Cassettari, M.B. d’Arcy, S.A. Gardiner, R.M. Godun, S. Schlunk, G.S. Summy).
- 20/11/2002: Seminar at University College London: *Quantum accelerator modes in atom optics: experiment, interpretation, and theory* (D. Cassettari, M.B. d’Arcy, S.A. Gardiner, R.M. Godun, S. Schlunk, G.S. Summy).
- 24/06/2002–01/07/2002: Visit to the Polska Akademia Nauk as the guest of Prof K. Rzażewski. Seminar: *Coherence of quantum accelerator modes and their application in an atomic beam-splitter* (S.A. Gardiner, S. Schlunk, M.B. d’Arcy, D. Cassettari, R.M. Godun, G.S. Summy, R. Bach, and K. Burnett).
- 03/06/2002–06/06/2002: Visit to the Universität Konstanz as the guest of Dr M.K. Oberthaler. Seminar: *Coherence of quantum accelerator modes and their application in an atomic beam-splitter* (S.A. Gardiner, S. Schlunk, M.B. d’Arcy, D. Cassettari, R. Godun, G.S. Summy, R. Bach, and K. Burnett).
- 02/12/2001–07/12/2001: Visit to NIST (National Institute of Standards and Technology) Gaithersburg as the guest of Dr W.D. Phillips. Seminar: *Cavity assisted quasiparticle damping in a BEC* (S.A. Gardiner, K.M. Gheri, P. Zoller).
- 29/10/2000–11/11/2000: Visit to the University of Oxford as the guest of Prof K. Burnett. Seminar: *Dynamics of a driven BEC and the influence of chaos* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).
- 25/05/2000: Seminar at the Universität Konstanz: *Dynamics of a driven BEC* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).

- 04/10/1999–20/11/1999: Visit to the University of Texas at Austin as the guest of Prof M.G. Raizen, to discuss the possible experimental implementation of theoretical work on quantum chaos and Bose-Einstein condensates. Series of three seminars: *The delta-kicked harmonic oscillator as a test-system for quantum chaos and BEC dynamics* (S.A. Gardiner, D. Jaksch, R. Dum, J.I. Cirac, P. Zoller).
- 24/02/1999: Seminar at the Universität Hannover: *Chaotic dynamics in single atoms and Bose-Einstein condensates* (S.A. Gardiner, D. Jaksch, J.I. Cirac, P. Zoller).
- 22/02/1999: Seminar at the Universität Potsdam: *Chaotic dynamics in single atoms and Bose-Einstein condensates* (S.A. Gardiner, D. Jaksch, J.I. Cirac, P. Zoller).
- 18/02/1999: Seminar at the Universität Basel: *Chaotic dynamics in single atoms and Bose-Einstein condensates* (S.A. Gardiner, D. Jaksch, J.I. Cirac, P. Zoller).
- 25/05/1997–06/06/1997: Visit to the Universität-Gesamthochschule Essen as the guest of Prof F. Haake. Seminar: *The quantum delta-kicked harmonic oscillator in a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 25/02/1996–01/02/1996: Visit to the California Institute of Technology as the guest of Prof H.J. Kimble. Seminars: *A quantum computer in cavity QED* (T. Pellizzari, S.A. Gardiner, J.I. Cirac, P. Zoller), and *Generation of arbitrary motional states of a single trapped ion* (S.A. Gardiner, J.I. Cirac, P. Zoller).
- 22/01/1995–27/01/1995: Visit to the California Institute of Technology as the guest of Prof H.J. Kimble. Seminar: *Generation of Fock states by adiabatic passage of many atoms* (S.A. Gardiner, P. Zoller).