

Andrew Carmichael

Curriculum Vitæ

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Abbreviations used throughout are listed below on page 6.

Contact Information

Address: Physics Department, SUNY Cortland, Bowers Hall, Cortland, NY 13045-0900 USA

Email: andrew.carmichael@cortland.edu

cmichael@phys.uconn.edu

Web: <http://www.cortland.edu/physics/>

<http://www.phys.uconn.edu/~cmichael/>

Phone: (+1) (607) 753 5697

Main Office: (+1) (607) 753 2821

Degrees

PhD: PhD, Physics, University of Connecticut, Storrs, CT, USA; 2008

MSc: MSc, Physics, University of Connecticut, Storrs, CT, USA; 2003

MPhys: MPhys with honours (2.1), Physics with European Studies (German), University of Sussex, Brighton, UK; 1998.

Awards

- Outstanding Teaching Assistant, American Association of Physics Teachers (AAPT), USA, 2007
- Outstanding Teaching Award, University of Connecticut Physics Department, Academic Year 2003-2004

Language Skills

English: native

French: written and spoken competence

German: written and spoken competence

Current Position

Assistant professor of physics, Department of Physics, State University of New York at Cortland, New York, USA.

Current Research Interests

General research themes include Bose-Einstein condensation, Feshbach resonances, magneto-association and photo-association, quantum optics and chaos theory.

Education

Education History

- **University of Sussex**, Brighton, Sussex, UK. Undergraduate course leading to MPhys degree in Physics with European Studies (German), 1994-1998.
- **Albert-Ludwig's Universität**, Freiburg, Germany. Undergraduate exchange student, academic year 1996-1997.
- **University of Connecticut**, Storrs, Connecticut, USA. Graduate work including MSc and PhD degrees in Physics, 1998-2008.

Graduate Work Details

Ph.D. thesis research in the Quantum Optics Group in the Department of Physics at the University of Connecticut, Storrs, CT, USA.

Major Advisor: Juha Javanainen, University of Connecticut, USA.

Associate Advisor: Robin Côté, University of Connecticut, USA.

Associate Advisor: Reinhold Blümel, Physics Department Head, Wesleyan University, Middletown, Connecticut, USA.

Thesis Research Topics: Bose-Einstein condensation, mean-field theories, Feshbach resonances, photo-association, magneto-association, quantum optics.

Thesis Title: “A Heisenberg Picture Mean Field Model for Magneto-association of a Quantum Degenerate Bose Gas Close to a Feshbach Resonance”

Thesis available here: <http://www.phys.uconn.edu/~cmichael/ACarmichaelThesis.pdf>

Research Experience as an Undergraduate

- Undergraduate project on chaos theory in ion traps under the supervision of Reinhold Blümel at Albert-Ludwig's Universität, Freiburg, Germany. The work was eventually published in *Physical Review E* (see publications), academic year 1996-1997.
- Undergraduate project designing monte-carlo simulations of master equations for atoms interacting with coherent and incoherent light and the vacuum under the supervision of Barry Garraway at the University of Sussex, Brighton, Sussex, UK., academic year 1997-1998.

Publications

- [1] A. Carmichael and J. Javanainen, “Mean-field stationary state of a Bose gas at a Feshbach resonance,” *Physical Review A (Atomic, Molecular, and Optical Physics)*, vol. 77, no. 4, p. 043616, 2008, <http://dx.doi.org/10.1103/PhysRevA.77.043616>.
- [2] M. Mackie, A. Carmichael, M. Koštrun, R. J. Perkins, C. Xu, Y. Zhen, K.-A. Suominen, and J. Javanainen, “Rapid adiabatic passage from an atomic to a molecular condensate,” 2002, <http://arxiv.org/abs/physics/0210131v2>.

- [3] J. Javanainen, M. Koštrun, M. Mackie, and A. Carmichael, “Simple mean-field theory for a zero-temperature fermionic gas at a Feshbach resonance,” *Phys. Rev. Lett.*, vol. 95, p. 110408, Sep 2005, <http://dx.doi.org/10.1103/PhysRevLett.95.110408>.
- [4] J. Javanainen, M. Koštrun, Y. Zheng, A. Carmichael, U. Shrestha, P. J. Meinel, M. Mackie, O. Dannenberg, and K.-A. Suominen, “Collective molecule formation in a degenerate Fermi gas via a Feshbach resonance,” *Phys. Rev. Lett.*, vol. 92, p. 200402, May 2004, <http://dx.doi.org/10.1103/PhysRevLett.92.200402>.
- [5] A. Ishkhanyan, M. Mackie, A. Carmichael, P. L. Gould, and J. Javanainen, “Landau-Zener problem for trilinear systems,” *Phys. Rev. A*, vol. 69, p. 043612, Apr 2004, <http://dx.doi.org/10.1103/PhysRevA.69.043612>.
- [6] R. Blümel, E. Bonneville, and A. Carmichael, “Chaos and bifurcations in ion traps of cylindrical and spherical design,” *Phys. Rev. E*, vol. 57, pp. 1511–1518, Feb 1998, <http://dx.doi.org/10.1103/PhysRevE.57.1511>.

Presentations

Invited Talks

General Audience

- “Quantum Physics for Beginners”, Naugatuck Valley Community College, Waterbury, CT, USA, 25th April 2007
- “BEC and Quantum Optics”, Trinity College, Hartford CT, USA, 24th October 2003.

Student Audience

- “Bose-Einstein Condensation, Feshbach Resonances and Quantum Optics for Fun and Profit”, University of Connecticut Physics Club Talk, Wednesday, 13th February 2008.

Physics Research Audience

- “Condensates close to a Feshbach resonance; a Quantum Optics Approach”, University of Sussex, Falmer, Sussex, UK, 1st July 2009.
- “Mean-field Stationary States for a Bose Gas at a Feshbach Resonance”, National Research Council, Ottawa, Ontario, Canada, 8th November 2007.
- “Atom-atom Scattering in Photoassociation of a BEC”, Wesleyan University, Middletown CT, USA, 25th April 2003.
- “Atom-atom Scattering in Photoassociation of a BEC”, University of Hertfordshire, Herts, UK, 12th August 2003.

Contributed Conference Presentations

Oral Presentations

- ‘Mean-field Stationary State of a Bose Gas at a Feshbach Resonance’, CAP congress, Laval Université, Quebec, Canada, 2008.
- ‘Mean-field Stationary State of a Bose Gas at a Feshbach Resonance’, DAMOP Conference, Penn State, Pennsylvania, USA, 27th-31st May 2008.

Poster Presentations

- “Investigation of a single boson species in a Feshbach resonance”, DAMOP conference, Knoxville Tennessee, USA, 16th-20th May 2006.
- “Investigation of a single boson species in a Feshbach resonance”, The Third University of Connecticut and ITAMP Open House, Harvard, Cambridge, Massachusetts, USA, 28th October 2006.
- “Some new results on two-well Bose-Hubbard problem”, DAMOP conference, Lincoln Nebraska, USA, 17th-21st May 2005.
- “Effects of atom-atom scattering on coherent photoassociation of an atomic BEC”, DAMOP conference, Boulder Colorado, USA, 20th-24th May 2003.

Conference Attendance (Non-presenting)

- DAMOP, University of Virginia, Charlottesville, Virginia, USA, 19th-23rd May 2009.
- APS March Meeting, New Orleans Louisiana, USA, 10th-14th March 2008.
- AAAS Annual Meeting, Boston Massachusetts, USA, 14th-18th February 2008.
- DAMOP Conference, Tuscon Arizona, USA, 25th-29th May 2004.
- The first University of Connecticut and ITAMP Open House, Harvard, Cambridge, Massachusetts, USA, 13th September 2003.
- OSA Annual Meeting/ ILS-XVI Conference, Providence Rhode Island, USA, 22nd-26th October 2000.
- DAMOP, Storrs Connecticut, USA, 14th-17th June 2000.
- APS March Meeting, Atlanta Georgia, USA, 20th-26th March 1999.

Teaching Experience

Advising

As Assistant Professor at SUNY Cortland, I have served as advisor to several undergraduate students since fall 2008.

Instructor of Record

Assistant Professor at the State University of New York at Cortland, USA since fall 2008. Courses taught so far:

- PHY 420 Classical mechanics; course for undergraduate physics majors.
- PHY 575 Introduction to quantum mechanics; course for undergraduate physics majors.
- PHY 105 Introductory mechanics and heat; a non-calculus based introductory course.
- PHY 106 Elementary light, electricity and sound; a non-calculus based introductory course.
- Laboratory for Physics 105 and 106. majors.

Instructor of record for undergraduate physics and mathematics courses at the University of Connecticut between spring 2004 and spring 2008:

- Physics 121, 122; first and second semester physics without calculus primarily for medical and pharmacy students.

- Physics 132; second semester physics with calculus primarily aimed at medical students.
- Physics 151, 152; first and second semester physics with calculus for engineers.
- Mathematics 105; finite mathematics for business students.

Other Teaching Experience

- In summer 2007 I taught the physics section of the UCONN Bridge programme for underrepresented minorities among the incoming undergraduate engineering students.
- I was an instructor for the UCONN Physics Olympics, a one-day programme for high school students to get hands-on experience with physics, May 2007.
- I have experience working with undergraduate summer students in our research group at UCONN.
- During the summer of 1999 I was the teacher for a group of schoolchildren in the UCONN KAST (Kids Are Scientists Too) programme.
- Laboratory Teaching Assistant for a variety of undergraduate physics courses at UCONN, 1998-2004.
- Teaching assistant for the discussion workshop for undergraduate physics at UCONN 2001-2003.
- During the years 2004 and 2005 I acted as a private tutor for two undergraduate students outside UCONN, and in fall 1998 for a high school student from Hartford, CT, USA.

Other Experience

Administrative Experience

- 2009: Scholarships committee, SUNY Cortland.
- 2000-2006: Served as graduate student representative on the teaching assignments committee at the University of Connecticut Physics Department.
- 2006: Served on the committee to choose a textbook for the 121/122 courses (algebra based introductory physics for science majors).
- 2007: Served on the committee to choose a textbook for the 151/152 courses (calculus based physics for engineers).
- I assisted the organization of the DAMOP conference at UCONN during 14th-17th June 2000.

Professional Societies

- Institute of Physics (IOP), London, UK.
- American Physical Society (APS), USA, since 1998.
- American Association of Physics Teachers (AAPT), USA.
- Canadian Association of Physicists (CAP), Canada.
- Optical Society of America, USA, 2000.

Citizenship and Visa Status

- Currently in the US with an H1B visa.
- Citizenship: British.

Abbreviations:

AAAS: American Association for the Advancement of Science

APS: American Physical Society

BEC: Bose-Einstein Condensate

CAP: Canadian Association of Physicists

DAMOP: Division of Atomic, Molecular and Optical Physics (an APS conference)

ILS: Interdisciplinary Laser Science Conference

IOP: Institute of Physics, London, UK

ITAMP: Institute for Theoretical Atomic and Molecular Physics at the Harvard-Smithsonian, Cambridge, MA, USA

OSA: Optical Society of America

SUNY: State University of New York, USA

UCONN: University of Connecticut, USA