



**7. LEAVES OF ABSENCE**

University, Company or Organization at which Leave was taken	Type of Leave	paid/unpaid	Dates

**8. TEACHING****(a) Areas of special interest and accomplishments**

I wish to help establish and build up the Atomic, Molecular and Optics subfield of Physics at UBC. My primary interest is in teaching at both the graduate and undergraduate levels a variety of courses including atomic physics and optics.

**(b) Courses taught at UBC [for last 5 years]**

Session	Course Number	Scheduled lecture hours per week	Class Size	Lectures	Hours Taught		
					Tutorials	Labs	Other (Office hours)
2004W	PHYS458	3	41	3		6	3
2004W	PHYS449	2	27	2			
2005S	PHYS523	3	9	3			1
2005S	PHYS308		16			3	1
2005S	PHYS449	2	27	2			
2005W	PHYS458	3	45	3		6	3

**(c) Graduate Students Supervised**

Student Name	Program Type	Year		Principal Supervisor	Co-Supervisor(s)
		Start	Finish		
Tao Kong	Masters	2003W	ongoing	K. Madison	
Swati Singh	Masters	2004W	ongoing	K. Madison	
Janelle Van Dongen	Masters	2005W	ongoing	K. Madison	
Keith Ladouceur	Masters	2005W	ongoing	K. Madison	

**(d) Continuing Education Activities****(e) Visiting Lecturer (indicate university/organization and dates)****(f) Other****9. SCHOLARLY AND PROFESSIONAL ACTIVITIES****(a) Areas of special interest and accomplishments**

My primary research interest centers on the application of laser cooled atomic gases to the study of fundamental predictions of quantum mechanics, both for single particle as well as many-body systems. This research direction is consistent with my work as a graduate student and as a postdoc at the ENS and holds great promise for its possible contributions to the physics of strongly correlated quantum systems. Studying such systems with cold atoms is a completely new approach to this field, traditionally pursued in the context of the electronic properties of ionic crystals, and may provide crucial information for the unraveling of certain long-standing mysteries such as high-Tc superconductivity.

Major accomplishments include the first ever observation of non-exponential decay of an unstable quantum system and the observation of vortex nucleation (and subsequent studies of vortex matter) in a dilute Bose Einstein Condensate. I am also interested in applied projects involving the integration of laser-cooled atoms and electronic devices, including the development of new atomic sensors and electro-optic devices using structured photonic band-gap materials coupled to single atoms.

**(b) Research or equivalent grants [for last 10 years]**

(indicate under COMP whether grants were obtained competitively (C) or non-competitively (NC))

<b>Granting Agency</b>	<b>Subject</b>	<b>COMP</b>	<b>\$ per year</b>	<b>Years</b>	<b>Principal Investigator</b>	<b>Co-Investigator(s)</b>
NSERC Discovery	"QMR..."	C	40.5 k	2004-2008	K. Madison	-
NSERC RTI	"QMR..."	C	149.5 k	2004	K. Madison	-
CFI New Ops	"QMR..."	C	437.5 k	2005	K. Madison	-
CFI-IOF	"QMR..."	C	52.5k k	2005	K. Madison	-

**(c) Research or equivalent contracts [for last 10 years]**

(indicate under COMP whether contracts were obtained competitively (C) or non-competitively (NC))

Granting Agency	Subject	COMP	\$ per year	Years	Principal Investigator	Co-Investigator(s)

#### (d) Invited Presentations

##### Invited Symposia Lectures

##### Invited Lectures

- *Coherence and correlations in quantum degenerate atomic gases.* American Physical Society Northwest Section Meeting, Victoria, British Columbia, CANADA, May 14, 2005.
- *Physics with ultra-cold atoms: an experimentalist's view.* University of British Columbia Colloquium: Vancouver, British Columbia, CANADA, January 27, 2005.
- *Quantum degenerate gases: an overview of experimental progress in this new branch of low temperature physics :* Simon Fraser University Colloquium: Burnaby, British Columbia, CANADA, November 12, 2004.
- *Overview of experimental progress with quantum degenerate gases.* Quantum Materials CIAR Meeting: Vancouver, British Columbia, CANADA, October 2004.
- *Quantum materials research with degenerate gases.* 3rd New Laser Scientist Conference (2004 Annual OSA Meeting): Rochester, New York, USA October 2004.
- *Quantum materials research with degenerate gases: one possible application of ultra-cold atoms.* Banff Cold Atom Meeting: Banff, Alberta, CANADA, February 2004.
- *Ion emission and fusion neutron yield from exploding deuterium and deuterated methane cluster plasmas.* Los Alamos National Laboratory: Los Alamos, NM, USA, November 2003.
- *Quantum materials research with ultra-cold atomic gases.* Institut de Ciencies Fotoniques: Barcelona, SPAIN, June 2003.
- *Dilute Bose-Einstein condensates and their role in the study of quantum fluids.* University of British Columbia: Vancouver, CANADA, April 2003.
- *Experiments with rotating Bose-Einstein condensates.* University of Texas at Austin: Austin, TX, USA, March 2003.
- *Experiments with rotating Bose-Einstein condensates.* New York University: New York, NY, USA, February 2003.

- *Vortex Nucleation and Dynamics in a Stirred Bose-Einstein Condensate*. Tokyo Institute of Technology: Tokyo, JAPAN, January 2001.
- *Vortex Nucleation and Dynamics in a Stirred Bose-Einstein Condensate*. Okayama University: Okayama, JAPAN, January 2001.
- *Experiments with degenerate Bose and Fermi Gases*. The Third Workshop on Laser Cooling: Shonan, JAPAN, January 2001.
- *Vortex Formation in a Stirred Bose-Einstein Condensate*. Quantum Fluids and Solids (QFS 2000): Minneapolis, MN, USA, June 2000.
- *Vortex Formation in a Stirred Bose-Einstein Condensate*. Quantum Electronics and Laser Science (CLEO/QELS 2000): San Francisco, CA, USA, May 2000.
- *Cold Collisions and their role in condensate physics*. 22nd International Conference on Low Temperature Physics (LT22): Espoo, FINLAND, August 1999.

**(e) Other Presentations**

- *Fusion neutrons from exploding deuterium cluster plasmas: a possible source for time-resolved neutron damage studies* Applications of High Field and Short Wavelength Sources IX: Palm Springs, California, USA; October 2001.
- *Fusion neutrons from exploding deuterium cluster plasmas: a possible source for time-resolved neutron damage studies* (poster) Gordon Research Conference : Materials Processes Far From Equilibrium: Meriden, NH; July 2001
- *Vortex Formation in a Stirred Bose-Einstein Condensate.* (poster) Seminar on Fundamentals of Quantum Optics V: Kühtai, AUSTRIA; January 2000.
- *A Spectroscopic Study of the Normal and Fractional Wannier-Stark Ladders.* 30th Annual Meeting of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society (DAMOP): Atlanta, GA; March 1999.
- *Non-Exponential Decay in Atomic Tunneling.* International Quantum Electronics Conference (IQEC): San Francisco, CA; May 1998.
- *Observation of Atomic Tunneling from an Accelerating Optical Potential.* Quantum Electronics and Laser Science (QELS): Baltimore, MD; May 1997.
- *Observation of Non-Exponential Decay in Atomic Tunneling.* Post deadline session, Quantum Electronics and Laser Science (QELS): Baltimore, MD; May 1997.
- *The Quantum Delta-Kicked Rotor.* Gordon Conference on Simple Dynamical Systems, 1996.
- *Can a Single-Pulse Standing Wave Induce Chaos in Atomic Motion?* 27th Annual Meeting of the Division of Atomic, Molecular, and Optical Physics of the American Physical Society (DAMOP): Ann Arbor, MI; May 1996.
- *Adaptive Target Tracking Control System.* 1992 IEEE Region 3 Conference: Birmingham, AL; April 1992.

**(f) Other (list PDFs, RAs, Visitors - including dates)**Postdoctoral FellowsResearch Associates

Bruce George Klappauf : R.A. at UBC Jan. 2004-present

Visitors**(g) Conference Participation (Organizer, Keynote Speaker, etc.)**

- Organizer of TRIUMF Summer Institute 2005 (July 11-22, 2005)  
Summer school organization done with Jens Dilling, Byron Jennings, and Matthew Pearson

**10. SERVICE TO THE UNIVERSITY**

**(a) Memberships on committees, including offices held and dates**

Departmental

University

**(b) Other service, including dates**

Masters Thesis reader, Russ Greenall (Physics), June 2004.

**11. SERVICE TO THE COMMUNITY**

**(a) Memberships on scholarly societies, including offices held and dates**

- Division of Laser Science, American Physical Society, 1994-present

**(b) Memberships on other societies, including offices held and dates**

**(c) Memberships on scholarly committees, including offices held and dates**

**(d) Memberships on other committees, including offices held and dates**

**(e) Editorships (list journal and dates)**

**(f) Reviewer (journal, agency, etc. including dates)**

Physical Review Letters, American Physical Society (since 1998)

Physical Review A, American Physical Society (since 1998)

Physics of Plasmas, American Institute of Physics (since 2002)

Chemical Physics Letters, Elsevier Science Ltd. (since 2002)

The Journal of Chemical Physics, American Institute of Physics (since 2002)

Europhysics Letters, Edition Diffusion Press Sciences (since 2000)

Physics Letters A, World Scientific Publishing (since 2002)

Natural Sciences and Engineering Research Council of Canada: NSERC (since 2004)

**(g) External examiner (indicate universities and dates)**

**(h) Consultant (indicate organization and dates)**

Microsoft Research (May 2004)

**(i) Other service to the community**

**12. AWARDS AND DISTINCTIONS**

**(a) Awards for Teaching (indicate name of award, awarding organizations, date)**

**(b) Awards for Scholarship (indicate name of award, awarding organizations, date)**

National Science Foundation NATO Postdoctoral Fellowship, NSF, ENS Paris, 1999-2000.

Outstanding Dissertation: Honorable Mention, Graduate School, UT Austin, 1999.

Chateaubriand Postdoctoral Fellowship, ENS Paris, 1998-1999.

Outstanding Dissertation Award, Department of Physics, UT Austin, 1998.

Fannie and John Hertz Foundation Research Grant, UT Austin, 1997.

Office of Naval Research Graduate Fellowship, ONR, UT Austin, 1992-1995.



Leon H. Scherck Memorial Award (for excellence in engineering), Tulane University, 1992.

Senior Scholar in Electrical Engineering, Tulane University, 1992.

Outstanding Freshman in the College of Engineering, Tulane University, 1998

Tulane University Dean's Honor Scholarship, Tulane University, 1988-1992

**(c) Awards for Service (indicate name of award, awarding organizations, date)**

**(d) Other Awards**

**13. OTHER RELEVANT INFORMATION**

(such as current personnel, major equipment, etc.) [*Max. 1 Page*]

**THE UNIVERSITY OF BRITISH COLUMBIA**  
*Publications Record*

**Date :** September 8, 2005

**Initials:** \_\_\_\_\_

**SURNAME:**

**FIRST NAME:**

**MIDDLE NAME(s):**

**Publication Summary :**

	1(a)	1(b)	1(c)	2(a,b,c)	3	4	5
Career Total							
Last 5 Years Total							

1 = Refereed Publications [\*]: (a) Journals; (b) Conference Proceedings; (c) Other

2 = Non-Refereed Publications : (a) Journals; (b) Conference Proceedings; (c) Other

3 = Books

4 = Patents

5 = Special Copyrights

[\*]=include pagination and indicate with an **asterisk** about 5 papers you consider of primary importance.

Enumerated references begin on following page.

## 1. REFEREED PUBLICATIONS

### (a) Journals

1. **Role of laser-pulse duration in the neutron yield of deuterium cluster targets**, K. W. Madison, P. K. Patel, M. Allen, D. Price, R. Fitzpatrick, T. Ditmire. *Physical Review A* **70**, 053201 (2004).
2. **Fusion neutron and ion emission from deuterium and deuterated methane cluster plasmas**, K. W. Madison, P. K. Patel, D. Price, A. Edens, M. Allen, T. E. Cowan, J. Zweiback, and T. Ditmire. *Physics of Plasmas* **11**, 270-277 (2004).
3. **An investigation of fusion yield from exploding deuterium cluster plasmas produced by 100 TW laser pulses** K. W. Madison, P. K. Patel, M. Allen, D. Price, and T. Ditmire. *Journal of the Optical Society of America B - Optical Physics* **20**, 113-117 (2003).
4. **Transverse Breathing Mode of an Elongated Bose-Einstein Condensate**. F. Chevy, V. Bretin, P. Rosenbusch, K. W. Madison, and J. Dalibard. *Physical Review Letters* **88**, 250402 (2002).
5. **Interferometric detection of a single vortex in a dilute Bose-Einstein condensate**. F. Chevy, K. W. Madison, V. Bretin, and J. Dalibard. *Physical Review A* **64**, 031601 (2001).
6. **Stationary States of a Rotating Bose-Einstein: Routes to Vortex Nucleation**. K. W. Madison, F. Chevy, V. Bretin, and J. Dalibard. *Physical Review Letters* **86**, 4443 (2001).
7. **An atom faucet**. W. Wohlleben, F. Chevy, K. W. Madison and J. Dalibard *The European Physical Journal D* **15**, 237-244 (2001).
8. **Measurement of the Angular Momentum of a Rotating Bose-Einstein Condensate**. F. Chevy, K. W. Madison, and J. Dalibard. *Physical Review Letters* **85**, 2223 (2000).
9. **Vortex lattices in a stirred Bose-Einstein Condensate**. K. W. Madison, F. Chevy, W. Wohlleben, and J. Dalibard. *Journal of Modern Optics* **47**, 2715 (2000).
10. **Vortex Formation in a Stirred Bose-Einstein Condensate**. K. W. Madison, F. Chevy, W. Wohlleben, and J. Dalibard. *Physical Review Letters* **84**, 806 (2000).
11. **Observation of the Wannier-Stark fan and the fractional ladder in an accelerating optical lattice**. K. W. Madison, M. C. Fischer, and M. G. Raizen. *Physical Review A* **60**, R1767 (1999).
12. **Dynamical Bloch band suppression in an optical lattice**. K. W. Madison, M. C. Fischer, R. B. Diener, Qian Niu, and M. G. Raizen. *Physical Review Letters* **81**, 5093 (1998).

13. **Observation of Rabi oscillations between Bloch bands in an optical potential.** M. C. Fischer, K. W. Madison, Qian Niu, and M. G. Raizen. *Physical Review A* **58**, R2648 (1998).
14. **Atom Optics as a Testing Ground for Quantum Chaos.** C. F. Bharucha, J. C. Robinson, F. L. Moore, K. W. Madison, S. R. Wilkinson, Bala Sundaram, and M. G. Raizen. *Atomic Physics* **15**, 62 (World Scientific, Singapore, 1997).
15. **Quantum Transport of Ultra-Cold Atoms in an Accelerating Optical Potential.** K. W. Madison, C. F. Bharucha, P. R. Morrow, S. R. Wilkinson, Q. Niu, Bala Sundaram, and M. G. Raizen. *Applied Physics B* **65**, 693 (1997).
16. **Experimental evidence for non-exponential decay in quantum tunneling.** S. R. Wilkinson, C. F. Bharucha, M. C. Fischer, K. W. Madison, P. R. Morrow, Qian Niu, Bala Sundaram, and M. G. Raizen. *Nature* **387**, 575 (1997).
17. **Observation of Atomic Tunneling from an Accelerating Optical Potential.** C. F. Bharucha, K. W. Madison, P. R. Morrow, S. R. Wilkinson, Bala Sundaram, and M. G. Raizen. *Physical Review A* **55**, R857 (1997).
18. **Observation of Atomic Wannier-Stark Ladders in an Accelerating Optical Potential.** S. R. Wilkinson, C. F. Bharucha, K. W. Madison, Qian Niu, and M. G. Raizen. *Physical Review Letters* **76**, 4512 (1996).
19. **Can a Single-Pulse Standing Wave Induce Chaos in Atomic Motion?** J. C. Robinson, C. F. Bharucha, K. W. Madison, F. L. Moore, Bala Sundaram, S. R. Wilkinson, and M. G. Raizen, *Physical Review Letters* **76**, 3304 (1996).

#### (b) Conference Proceedings

1. **Formation of quantized vortices in a gaseous Bose-Einstein condensate.** F. Chevy, K. W. Madison, V. Bretin, and J. Dalibard. *Proceedings of Trapped particles and fundamental physics Workshop: Les Houches 2001*, (2001).

#### (c) Other

**2. NON-REFEREED PUBLICATIONS**

**(a) Journals**

1. Sample non-ref journal entry

**(b) Conference Proceedings**

1. **Adaptive Target Tracking Control System.** K. W. Madison. *Proceedings of the 1992 IEEE Region 3 Conference*, (1992).

**(c) Other**

1. Sample non-ref other entry

**3. BOOKS**

**(a) Authored**

**(b) Edited**

**(c) Chapters**

**4. PATENTS**

**5. SPECIAL COPYRIGHTS**

**6. ARTISTIC WORKS, PERFORMANCES, DESIGNS**

**7. OTHER WORKS**

**8. WORK SUBMITTED (including publisher and date of submission)**

**9. WORK IN PROGRESS (including degree of completion)**

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