

Dr. Martin John Madsen

Department of Physics
Wabash College
P.O. Box 352
Crawfordsville, IN 47933

Phone: 765-361-6071
Fax: 765-361-6340
email: madsenm@umich.edu
<http://www.iontrap.wabash.edu>

EDUCATION

- August 2006 Ph.D. in Physics, *University of Michigan*, Ann Arbor, MI
Advisor: Chris Monroe, Physics
Thesis Title: “*Advanced Ion Trap Development and Ultrafast Laser-Ion Interactions*”
- August 2004 Masters of Science in Physics, *University of Michigan*, Ann Arbor, MI
- May 2001 Bachelors of Science in Honors Physics, *Purdue University*, West Lafayette, IN
Graduated with Highest Distinction

TEACHING EXPERIENCE

- 2006-
present **Assistant Professor of Physics**
Wabash College
Crawfordsville, IN
- Fall 2005 **Discussion Session Instructor**
University of Michigan
Ann Arbor, MI
- 2000 **Teaching Assistant**
Purdue University
West Lafayette, IN

RESEARCH EXPERIENCE

- 2006-
present **Principal Investigator**
Wabash College
Crawfordsville, IN
Trapped Ion Quantum Information Laboratory
- 2001-
2006 **Graduate Student Research Assistant**
University of Michigan
Ann Arbor, MI
Supervisor: Chris Monroe
- 1999-
2000 **Undergraduate Research Technician**
Purdue University
West Lafayette, IN
Supervisor: David Nolte

HONORS AND AWARDS

- 2001-2003 *Rackham Fellowship*, University of Michigan
- 2002 *Peter Franken Award*, Department of Physics, University of Michigan. “Awarded to a first or second year graduate student who has done outstanding work in Physics.”
- 2000, 2001 *Richard W. King Memorial Award*, Department of Physics, Purdue University. “In recognition of past achievements and future promise as a student of physics.”
- 1988 *Eagle Scout*, Boy Scouts of America

UNDERGRADUATE RESEARCH STUDENTS

- | | |
|----------------------|------------------------|
| Kyle Prifogle (2009) | Sam Krutz (2009) |
| Chris Beard (2010) | Lucian Lupinski (2011) |
| Rabin Paudel (2010) | Yijun Tang (2012) |

SERVICE TO THE COLLEGE

- Society of Physics Students Faculty Advisor
- MCAT Preparation Session, Physics Section
- Faculty Community Service Co-chair (2007-2009)
- Faculty Safety Committee Co-chair (2007-2009)

PROFESSIONAL SERVICE

- Reviewer for: *Physical Review Letters*, *Physical Review A*
- Grant reviewer for the National Science Foundation

VOLUNTEER AND COMMUNITY SERVICE

- 2000-2007 American Red Cross, Disaster Services Volunteer
- 1998-2004 Boy Scouts of America volunteer Scoutmaster and Cub Scout den leader
- 1994-1996 Missionary for the Church of Jesus Christ of Latter-day Saints in the Caracas Venezuela Mission

PROFESSIONAL MEMBERSHIPS

- American Physical Society
- American Association of Physics Teachers

PUBLICATIONS

1. Madsen, M. J., “**Ohm’s law for a wire in contact with a thermal reservoir,**” *American Journal of Physics*, v 77, n 6, June 2009, pp 516-519.
2. Moehring, D. L., Madsen, M. J., Younge, K. C., Kohn, R. N. Jr.*, Maunz, P., Duan, L.-M., and Monroe, C., “**Quantum networking with photons and trapped atoms,**” *Journal of the Optical Society of America B*, v 24, n 2, Feb 2007, p. 300
3. Maunz, P., Moehring, D. L., Madsen, M. J., Kohn, R. N. Jr.*, Younge, K. C., and Monroe, C., “**Quantum Interference of Photon Pairs from Two Trapped Atomic Ions,**” *quant-ph/0608047* (2006)
4. Deslauriers, L., Acton, M., Blinov, B. B., Brickman, K.-A., Haljan, P. C., Hensinger, W. K., Hucul*, D., Katnik, S., Kohn, R. N.*, Lee, P. J., Madsen, M. J., Maunz, P., Olmschenck, S., Moehring, D. L., Stick, D., Sterk, J., Yeo, M.*, Younge, K. C., and Monroe, C., “**Efficient photoionization-loading of trapped cadmium ions with ultrafast pulses,**” *Physical Review A (Atomic, Molecular, and Optical Physics)*, v 74, 2006, p 063421
5. Duan, L.-M., Madsen, M. J., Moehring, D. L., Maunz, P., Kohn, R. N. Jr., and Monroe, C., “**Probabilistic Quantum Gates between Remote Atoms through Interference of Optical Frequency Qubits,**” *Physical Review A (Atomic, Molecular, and Optical Physics)*, vol 73, 2006, p 062324
6. Madsen, M. J., Moehring, D. L., Maunz, P., Kohn, R. N. Jr., Duan, L.-M., and Monroe, C., “**Ultrafast Coherent Coupling of Atomic Hyperfine and Photon Frequency Qubits,**” *Physical Review Letters*, vol 97, 2006, p 040505
7. Blinov, B. B., Kohn, R. N. Jr., Madsen, M. J., Maunz, P., Moehring, D. L., and Monroe, C., “**Broadband laser cooling of trapped atoms with ultrafast pulses**” *Journal of the Optical Society of America B*, v 23, n 6, June 2006, p 1170
8. Stick, D., Hensinger, W. K., Madsen, M. J., Olmschenk, S., Schwab, K., and Monroe, C., “**Ion trap in a Semiconductor Chip**” *Nature Physics*, v 2, 2006, p 36
9. Moehring, D. L., Blinov, B. B., Gidley, D.W., Kohn, R. N. Jr., Madsen, M. J., Sanderson, T.D., Vallery, R.S., and Monroe, C., “**Precision lifetime measurements of a single trapped ion with ultrafast laser pulses**” *Physical Review A (Atomic, Molecular, and Optical Physics)*, v 73, n 2, 14 Feb 2006, p 023413
10. Moehring, D. L., Acton, M., Blinov, B. B., Brickman, K.-A., Deslauriers, L., Haljan, P. C., Hensinger, W. K., Hucul, D., Kohn, R. N., Lee, P. J., Madsen, M. J., Maunz, P., Olmschenck, S., Stick, D., Yeo, M., Monroe, C., and Rabchuk, J., “**Ion Trap Networking: Cold, Fast, and Small**” *Laser Spectroscopy XVII*, E. Hinds, A. Ferguson, and E. Riis, eds. (World Scientific, 2005) pg. 421
11. Moehring, D.L., Madsen, M.J., Blinov, B.B., Monroe, C., “**Experimental Bell inequality violation with an atom and a photon,**” *Physical Review Letters*, v 93, n 9, 27 Aug 2004, p 090410/1-4
12. Madsen, M.J., Hensinger, W.L., Stick, D., Rabchuk, J.A., Monroe, C., “**Planar ion trap geometry for microfabrication,**” *Applied Physics B-Lasers and Optics*, v 78, n 5, Mar 2004, p 639-651

13. Lee, P.J., Blinov, B.B., Brickman, K., Deslauriers, L., Madsen, M.J., Miller, R., Moehring, D.L., Stick, D., Monroe, C. **“Atomic qubit manipulations with an electro-optic modulator,”** *Optics Letters*, v 28, n 17, 1 Sep 2003, p 1582-4
14. Deslauriers, L., Haljan, P.C., Lee, P.J., Brickman, K-A., Blinov, B.B., Madsen, M.J., Monroe, C. **“Zero-Point cooling and low heating of trapped $^{111}\text{Cd}^+$ ions,”** *Physical Review A (Atomic, Molecular, and Optical Physics)*, v 70, n 4, Apr 2003, p 043408/1-5
15. Blinov, B.B., Deslauriers, L., Lee, P., Madsen, M.J., Miller, R., Monroe, C., **“Sympathetic cooling of trapped Cd^+ isotopes,”** *Physical Review A (Atomic, Molecular, and Optical Physics)*, v 65, n 4, Apr 2002, p 040304/1-4

PRESENTATIONS

“Compact Halo Ion Traps,” poster presented at the *Gordon Conference for Atomic Physics*, Tilton, NH, July 2009

“Halo Ion Traps,” invited talk presented at the national New Laser Scientists Conference in Rochester, NY, October 23, 2008

“Energy: A model interdepartmental, integrated lab/lecture course for non-majors,” invited talk presented at the Biannual Conference on Chemical Education, Bloomington, IN, July 29, 2008

“The (Monon) Bell Inequality,” 3rd annual Monon Bell invited talk, DePauw University, November 2007

“Trapping Ions on a Shoestring” poster presented at the *Gordon Conference for Atomic Physics*, Tilton, NH, July 2007

“Who killed Schrödinger’s Cat?” invited talk presented at Indiana State University, October 2006

“Ultrafast Optical Rabi Oscillations on a Single Ion” talk presented at *APS Division of Atomic, Molecular, and Optical Physics (DAMOP)*, University of Tennessee, Knoxville, TN, May 2006

“Probabilistic entanglement of two remotely-located trapped ions” poster presented at the *Gordon Conference for Atomic Physics*, Tilton, NJ, June 2005

“Hot Topics in Cool Ions and Fast Lasers x2,” invited talk at the January 2005 FOCUS Center luncheon, University of Michigan, Ann Arbor, MI.

“Fabrication of a GaAs/AlGaAs ion trap for quantum computing,” talk presented at *APS Division of Atomic, Molecular, and Optical Physics (DAMOP)*, University of Arizona, Tucson, AZ, May 2004

“Quantum control of individual cold ions with fast shaped laser pulses,” poster presented at *Workshop on Trapped Ion Quantum Computing 2004*, University of Michigan, Ann Arbor, MI, May 2004

“Towards Micro-fabricated Ion Trap Quantum Computing,” talk presented at the *APS Ohio-Michigan Section Meeting*, Michigan State University, Lansing, MI, April 2003

“Trapped Cadmium Ions for Clean Quantum Computing,” poster presented at *International Conference of Atomic Physics (ICAP)*, MIT, Cambridge, MA, August 2002