Michael R. Peterson
Curriculum Vitae

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Condensed Matter Theory Center
Department of Physics
University of Maryland College Park
College Park, MD 20742-4111
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Research

Postdoctoral Research Associate — September 2007 - present
University of Maryland College Park — College Park, MD
Condensed Matter Theory Center
Department of Physics
Perform original research in theoretical condensed matter physics under the supervision of Prof. Sankar Das Sarma.

Postdoctoral Scholar — September 2005 - July 2007
University of California Santa Cruz — Santa Cruz, CA
Department of Physics
Perform original research in theoretical condensed matter physics under the supervision of Prof. B. Sriram Shastry.

Education

Pennsylvania State University — August 2005
Ph.D. in Physics — University Park, PA
Advisor: Prof. Jainendra K. Jain
Thesis: Perturbative Improvements and Exotic Excitations of Composite Fermions

University of Utah — May 2000
B.Sc. in Physics — Salt Lake City, UT

University of Utah — May 2000
B.Sc. in Mathematics — Salt Lake City, UT

Research

My research involves theoretical studies of strongly correlated systems in condensed matter and atomic physics where I employ a variety of methods, mostly computationally heavy and numerical in nature, such as Monte Carlo, Exact/Lanczos diagonalization, and parallelization using high performance computer clusters. Some of the specific subjects that I am interested in are:

- Fractional quantum Hall effect
- Topological quantum computation
- Quantum phases of cold atom systems and optical lattices
- Thermoelectrics in strongly correlated electron systems
- Composite fermion theory
- Lattice models of strongly correlated systems, i.e. Hubbard and t-J models

Publications

17. Michael R. Peterson and Sankar Das Sarma, *Quantum Hall Phase Diagram of Second Landau-level Half-filled Bilayers: Abelian versus Non-Abelian States*, arXiv:0908.3481 (2009).

16. Michael R. Peterson, Kwon Park, and Sankar Das Sarma, *Spontaneous Particle-Hole Symmetry Breaking in the $\nu = 5/2$ Fractioinal Quantum Hall Effect*, Physical Review Letters 101, 156803 (2008).

15. Michael R. Peterson, Chuanwei Zhang, Sumanta Tewari, and Sankar Das Sarma, *Realizing the Strongly Correlated d-Mott State in a Fermionic Cold Atom Optical Lattice*, Physical Review Letters 101, 150406 (2008).

14. Michael R. Peterson, Thierry Jolicoeur, and Sankar Das Sarma, *Finite Layer Thickness Stabilizes the Pfaffian State for the 5/2 Fractional Quantum Hall Effect: Wavefunction Overlap and Topological Degeneracy*, Physical Review Letters 101, 016807 (2008).

13. Michael R. Peterson, Thierry Jolicoeur, and Sankar Das Sarma, *Orbital Landau level dependence of the fractional quantum Hall effect in quasi-two dimensional electron layers: finite-thickness effects*, Physical Review B 78, 155308 (2008). Selected for the Virtual Journal of Nanoscale Science and Technology (October 2008).

12. Michael R. Peterson, Subroto Mukerjee, B. Sriram Shastry, and Jan O. Haerter, *Dynamical thermal response functions for strongly correlated one-dimensional systems: Hubbard and spinless fermion t-V model*, Physical Review B 76, 125110 (2007).

11. Michael R. Peterson, B. Sriram Shastry, and Jan O. Haerter, *Thermoelectric effects in a strongly correlated model for Na_xCoO_2*, Physical Review B 76, 165118 (2007).

10. Jan O. Haerter, Michael R. Peterson, and B. Sriram Shastry, *Finite temperature properties of the triangular lattice t-J model, applications to Na_xCoO_2*, Physical Review B 74, 245118 (2006).

9. Jan O. Haerter, Michael R. Peterson, and B. Sriram Shastry, *Strong Correlations Produce the Curie-Weiss Phase of Na_xCoO_2*, Physical Review Letters 97, 226402 (2006).

8. Csaba Toke, Michael R. Peterson, Gun Sang Jeon, and Jainendra K. Jain, *Fractional quantum Hall effect in the second Landau level: The importance of inter-composite-fermion interaction*, Physical Review B 72, 125315 (2005).

7. Gun Sang Jeon, Michael R. Peterson, and J. K. Jain, *Microscopic tests of topological electron-vortex binding in the fractional Hall effect*, Physical Review B 72, 035304 (2005).

6. Jainendra K. Jain and Michael R. Peterson, *Reconstructing the Electron in a Fractionalized Quantum Fluid*, Physical Review Letters 94, 186808 (2005).

5. Jainendra K. Jain, Kwon Park, Michael R. Peterson and Vito W. Scarola,, *Composite Fermion Theory of Excitations in the Fractional Quantum Hall*, Solid State Communications 135, 602-609 (2005).

4. Michael R. Peterson and Jainendra K. Jain, *Flavor Altering Excitations of Composite Fermions*, Physical Review Letters 93, 046402 (2004).

3. Jainendra K. Jain, Chia-Chen Chang, Gun Sang Jeon, and Michael R. Peterson, *Composite fermions in the neighborhood of $\nu = 1/3$*, Solid State Communications 127, 805-811 (2003).

2. Michael R. Peterson and Jainendra K. Jain, *Possible persistence of fractional quantum Hall effect down to ultralow fillings*, Physical Review B 68, 195310 (2003).

1. Sudhansu S. Mandal, Michael R. Peterson, and Jainendra K. Jain, *Two-Dimensional Electron System in High Magnetic Fields: Wigner Crystal versus Composite-Fermion Liquid*, Physical Review Letters 90, 106403 (2003).

Talks

17. *The fractional quantum Hall effect at 5/2: finite thickness, topological degeneracy, and particle-hole symmetry* — June 25, 2009
Emergent Phenomena in Quantum Hall Systems 3 Workshop — Capannori, Italy

16. *Reality of the topological non-Abelian Pfaffian description of the fractional quantum Hall effect at filling factor 5/2* — January 23, 2009
Physics Seminar
George Mason University — Fairfax, VA

15. *Finite Layer Thickness Stabilizes the Pfaffian State for the 5/2 Fractional Quantum Hall Effect: Wavefunction Overlap and Topological Degeneracy* — March t.b.a., 2009
Invited Talk, American Physical Society March Meeting — Pittsburgh, PA

14. *Correlated d-Mott State in Fermionic Cold Atoms* — October 15, 2008
Condensed Matter Theory Center Symposium
University of Maryland — College Park, MD

13. *Fractional Quantum Hall Effect in Higher Landau Levels* — March 10, 2008
Contributed Talk, American Physical Society March Meeting — New Orleans, LA

12. *Thermoelectric effects in a strongly correlated model for Sodium Cobalt Oxide ($Na_x CoO_2$)* — September 28, 2007
Condensed Matter Theory Center Symposium on "Quantum Phenomena"
University of Maryland — College Park, MD

11. *Thermal response functions for 1D strongly correlated electron systems* — March 8, 2007
Contributed Talk, American Physical Society March Meeting — Denver, CO

10. *Fractional quantum Hall effect and composite fermions* — February 12, 2007
Quantum Computing Seminar, UC Berkeley — Berkeley, CA

9. *Strong electron correlations and sodium cobalt oxide $Na_x CoO_2$* — February 9, 2007
Condensed Matter Seminar, UC Santa Cruz — Santa Cruz, CA

8. *Exotic Excitations of Composite Fermions* — March 15, 2006
Invited Talk, American Physical Society March Meeting — Baltimore, MD

7. *Thermoelectric properties of $Na_{0.68} CoO_2$ on a 2D triangular lattice* — March 13, 2006
Contributed Talk, American Physical Society March Meeting — Baltimore, MD

6. *Two-Dimensional Electrons in a High Magnetic Field: Composite Fermions and the fractional quantum Hall effect* — November 4, 2005
Condensed Matter Seminar, UC Santa Cruz — Santa Cruz, CA

5. *Re-emergence of the electron in a fractional quantum Hall fluid* — March 24, 2005
Contributed Talk, American Physical Society March Meeting — Los Angeles, CA

4. *Excitations of Composite Fermions and the Stability of the Liquid State* — March 26, 2004
Contributed Talk, American Physical Society March Meeting — Montreal, CN

3. *Competition Between Wigner Crystal and Composite Fermion Liquid* — March 3, 2003
Contributed Talk, American Physical Society March Meeting — Austin, TX

2. *Seminar* — March 18, 2004
Consortium for Education in Many-Body Applications
Seminar, The Pennsylvania State University — University Park, PA

1. *Seminar* — February 26, 2003
Consortium for Education in Many-Body Applications
Seminar, The Pennsylvania State University — University Park, PA

Poster

Poster Session — December 11, 2003
Consortium for Education in Many-Body Applications
Poster Session, The Pennsylvania State University, — University Park, PA

Teaching

Substitute Lecturer — Fall 2005 - Spring 2007
University of California Santa Cruz
Substitute lecturer for graduate level Classical Mechanics, Many-body Physics, and Solid State Physics for Prof. B. Sriram Shastry

Teaching Assistant — Spring 2001 - Spring 2002
Professor: Dr. Xiaoxing Xi — The Pennsylvania State University
Recitation/laboratory instructor for undergraduate thermodynamics/modern physics class.

Teaching Assistant — Summer 2001
Professor: Dr. Rafael Garcia — The Pennsylvania State University
Recitation/laboratory instructor for undergraduate thermodynamics/modern physics class.

Teaching Assistant — Fall 2000
Professor: Dr. Roy F. Willis — The Pennsylvania State University
Recitation instructor for undergraduate classical physics class.

Conferences, Workshops, and Summer Schools

Topological Order: From Quantum Hall Systems to Magnetic Materials — July 12 - 18, 2009

Max Planck Institute PKS — Dresden, Germany

Emergent Phenomena in Quantum Hall Systems 3 Workshop — June 25 - 28, 2009
Villa Guinigi — Capannori, Italy

American Physical Society March Meeting — March, 2009
Pittsburgh, PA

Topological Phases in Condensed Matter — October 24 - 26, 2008
Institute for Condensed Matter Theory
University of Illinois at Urbana-Champaign — Urbana, IL

Summer School on Condensed Matter Physics — August 11 - 14, 2008
Princeton Center for Theoretical Science
Princeton University — Princeton, NJ

American Physical Society March Meeting — March, 2008
New Orleans, LA

American Physical Society March Meeting — March, 2007
Denver, CO

American Physical Society March Meeting — March, 2006
Baltimore, MD

American Physical Society March Meeting — March, 2005
Los Angeles, CA

American Physical Society March Meeting — March, 2004
Montreal, CN

The Electron Liquid Model in Condensed Matter Physics — July 29 - August 8, 2003
International School of Physics "Enrico Fermi" — Varenna, Italy

American Physical Society March Meeting — March, 2003
Austin, TX

Awards/Honors

Duncan Fellowship — 2001
Department of Physics — The Pennsylvania State University

President's Award — 1996-2000
Outstanding Scholastic Achievement — The University of Utah

Outstanding Physics Junior Award — 1998-1999
Department of Physics — The University of Utah

Mathematical Contest in Modeling — 1999
Honorable Mention — The University of Utah

Journal Referee

Physical Review	Since 2008
Journal of Applied Physics	Since 2007

Memberships

American Physical Society	2000 - present
Consortium for Education in Many-body Applications (CEMBA)	2002 - 2005
The Pennsylvania State University	University Park, PA

References

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