Curriculum Vitae

Joel E. Moore

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Research area

Theoretical condensed matter physics: my main interest is in understanding the varied quantum phases of correlated electrons in zero-, one-, and two-dimensional geometries.

Degrees and positions held

Assistant Professor, Department of Physics, University of California, Berkeley
Appointed July 1, 2001; active 1/1/2002–present

Postdoctoral member of technical staff, Bell Labs, 12/2000–12/2001
Member of theoretical physics section, Physical Sciences Research, Murray Hill, NJ

Graduate Fellow, Institute for Theoretical Physics, UCSB, fall 2000

Ph.D., Department of Physics, MIT, 1996–2000
Fannie and John Hertz Foundation Fellow
Thesis "Phase transitions and symmetry breaking in quantum Hall edge states"
Thesis advisor: Prof. Xiao-Gang Wen

US Fulbright Grantee, 1995–1996
Host institution: Tata Institute of Fundamental Research, Bombay, India

A. B. *summa cum laude*, Department of Physics, Princeton University, 1995
Certificate (minor) in applied and computational mathematics

Honors, awards, and fellowships

Hellman Fellowship, 2003–2004 ($40,000)

MIT K. T. Compton Fellowship; ITP Graduate Fellowship

Kusaka Memorial Prize (highest Princeton undergraduate physics award), 1993–1994, 1994–1995; elected to Phi Beta Kappa, Sigma Xi, 1995

Satterlee Medal (overall academic achievement), St. Albans School, 1991; national 11th place, Westinghouse Science Talent Search

Statement of current research support

National Science Foundation CAREER grant, "Correlation, coherence, and disorder in nanoscale devices and complex materials," DMR-0238760, total $400,000, 5/2003-4/2008

UC Berkeley and Lawrence Berkeley Laboratory startup funds (total $210,000; $40,000 remaining)

Lead PI, Berkeley shared nanoscience computing cluster (112-processor Linux cluster donated by IBM in 2005; shared among 6 PIs in physics, chemistry, and materials science)

Co-PI, Lawrence Berkeley Laboratory program in thermoelectric materials (c. $80,000/year).

Co-PI, Lawrence Berkeley Laboratory LDRD (seed program) in correlated oxide interfaces

Co-PI, Western Institute of Nanoscience (K. Wang, UCLA, director)

Teaching, service, and student supervision

Reviewer, *Physical Review Letters*, *Physical Review B*, and other journals, 2000-present
Reviewer, National Science Foundation, Dutch FOM, Petroleum Research Fund, 2003-present

Instructor for undergraduate and graduate physics courses (quantum mechanics; advanced statistical mechanics; many-body theory), UC Berkeley.

Postdoctoral reseachers: Dr. Subroto Mukerjee, Ph.D. Princeton University (2005); Dr. Daniel Podolsky, Ph.D. Harvard University, 2004 (shared with A. Vishwanath).
Doctoral students: Mr. Noah Bray-Ali, Mr. Padraig Murphy, and Mr. Cenke Xu.

Academic references

Professor Xiao-Gang Wen (thesis advisor)
Cecil B. and Ida Green Professor of Physics
Department of Physics, MIT
77 Massachusetts Avenue
Cambridge, MA 02139

Professor Patrick Lee
William and Emma Rogers Professor of Physics
Department of Physics, MIT
77 Massachusetts Avenue Room 12-117
Cambridge, MA 02139

Professor F. Duncan M. Haldane
Professor of Physics
Princeton University
Jadwin Hall
Princeton, NJ 08544

Professor Marc Kastner, Department Head
Donner Professor of Physics
Department of Physics, MIT
77 Massachusetts Avenue Room 6-113
Cambridge, MA 02139

Professor Eduardo Fradkin
Department of Physics, University of Illinois
110 West Green Street
Urbana, Illinois 61801

Selected recent invited talks

International Center for Theoretical Physics (Trieste, Italy), 12/9/02
TIFR (Mumbai, India), 1/13/02
UT Austin, 3/25/03
Stanford University, 5/29/03
Brookhaven National Laboratory, 8/26/03
University of Toronto, 3/8/04
KITP, University of California, Santa Barbara (program), 5/04
Brookhaven National Laboratory (workshop), 9/13/04
University of Virginia (colloquium), 10/22/04
National Science Foundation (workshop), 10/27/04
University of San Francisco (colloquium), 11/17/04
PiTP, University of British Columbia, 12/13/04
IIT-Bombay (conference; declined) 12/04
ICTP (conference), 3/2/05
Caltech, 3/7/05
UCLA, 3/9/05
Univ. of Indiana, 4/8/05
Univ. of Illinois, 4/11/05
UC Davis, 4/28/05
MPI-Dresden (workshop), 5/13/05
APCTP, Korea (declined conference talk) 8/05
CSU Northridge (colloquium) 9/28/05

List of refereed publications

Joel E. Moore

1. J. E. Moore and N. J. Fisch, "Guiding-center equations for electrons in ultraintense laser fields," Phys. of Plasmas **1**, 1105–1116 (1994).

2. J. E. Moore and F. D. M. Haldane, "Edge excitations of the $\nu = 2/3$ spin-singlet quantum Hall state," Phys. Rev. B **55**, 7818–7823 (1997).

3. J. E. Moore, "Nonlinear radiation pressure and stochasticity in ultraintense laser fields,"

Phys. Rev. E **59**, 2281–2285 (1999).

4. J. E. Moore and X.-G. Wen, "Classification of disordered phases of quantum Hall edge states," Phys. Rev. B **57**, 10138–10156 (1998).

5. J. E. Moore and X.-G. Wen, "Anomalous magnetic splitting of the Kondo resonance," Phys. Rev. Lett. **85**, 1722–1725 (2000).

6. J. E. Moore, P. Sharma, and C. Chamon, "Nonequilibrium tunneling into general quantum Hall edge states," Phys. Rev. B **62** 7298–7302 (2000).

7. J. E. Moore, A. Zee, and J. Sinova, "Quantum Hall plateau transition at order $1/N$", Phys. Rev. Lett. **87**, 6801–6804 (2001).

8. J. E. Moore, "Connecting polymers to the quantum Hall plateau transition", Phys. Rev. B **65**, 5307–5315 (2002).

9. J. E. Moore, "Mobility edge scaling at semiclassical and dissipative quantum Hall transitions", Phys. Rev. B **65**, R1309–R1312 (2002).

10. J. E. Moore and X.-G. Wen, "Critical points in edge tunneling between generic FQH states", Phys. Rev. B **66**, 115305 (2002).

11. J. E. Moore, "Conservation laws in the quantum Hall Liouvillian theory and its generalizations", Nucl. Phys. B **661**, 514–532 (2003).

12. A. Vishwanath, J. E. Moore, and T. Senthil, "Screening and dissipation at the superconductor-insulator transition induced by a metallic ground plane", Phys. Rev. B **69**, 054507 (2004).

13. J. E. Moore and D. H. Lee, "Geometric effects on T-breaking in p+ip and d+id superconducting arrays", Phys. Rev. B **69**, 104511 (2004).

14. V. Aji, J. E. Moore, and C. M. Varma, "Higher harmonics of electronic-vibrational coupling in single-molecule devices", Int. J. Nano. **3**, 255 (2004).

15. N. Bray-Ali and J. E. Moore, "Quantum destruction of stiffness in diluted antiferromagnets and superconductors", Phys. Rev. B 69, 184505 (2004).

16. C. Xu and J. E. Moore, "Strong-weak coupling self-duality in the two-dimensional quantum phase transition of p+ip superconducting arrays", Phys. Rev. Lett. **93**, 047003 (2004).

17. C. Xu and J. E. Moore, "Dimensional reduction in superconducting arrays and frustrated magnets," Nucl. Phys. B **716**, 487 (2005).

18. G. Refael and J. E. Moore, "Entanglement entropy of random quantum critical points in one dimension", Phys. Rev. Lett. **93**, 260602 (2004).

19. C. Xu and J. E. Moore, "Nonequilibrium charge density wave from anomalous Hall effect in itinerant helical magnets", Sol. St. Comm. **135**, 62 (2005).

20. C. Xu and J. E. Moore, "Geometric criticality between plaquette phases in integer-spin kagome XXZ antiferromagnets", Phys. Rev. B **72**, 064455 (2005).

21. C. P. Weber, N. Gedik, J. E. Moore, J. W. Orenstein, J. Stephens, and D. D. Awschalom, "Observation of spin Coulomb drag in a two-dimensional electron gas", Nature **437**, 1330 (2005).

22. N. Bray-Ali, J. E. Moore, T. Senthil, and A. Vishwanath, "Ordering near the percolation threshold in models of 2D interacting bosons with quenched dilution", Phys. Rev. B. **73**, 064417 (2006).

23. C. Xu and J. E. Moore, "Stability of the quantum spin Hall effect: effects of interactions, disorder, and Z_2 topology", Phys. Rev. B **73**, 045322 (2006).

24. A. Seidel, H. Fu, D.-H. Lee, J. M. Leinaas, and J. E. Moore, "Incompressible Quantum Liquids and New Conservation Laws", Phys. Rev. Lett. **95**, 266405 (2005).

25. D. Podolsky, A. Vishwanath, J. E. Moore, and S. Sachdev, "Thermoelectric transport near pair breaking quantum phase transition out of d-wave superconductivity", cond-mat/0510597, submitted to Phys. Rev. Lett.

26. S. Mukerjee, C. Xu, and J. E. Moore, "Topological defects and the superfluid transition of the $s = 1$ spinor condensate in two dimensions", cond-mat/0605102, submitted to Phys. Rev. Lett.

27. A. G. Green, J. E. Moore, S. L. Sondhi, and A. Vishwanath, "Current fluctuations near to the 2D superconductor-insulator quantum critical point", cond-mat/0605615, submitted to Phys. Rev. Lett.

28. E. Fradkin and J. E. Moore, "Entanglement entropy of 2D conformal quantum critical points: hearing the shape of a quantum drum", Phys. Rev. Lett. **97**, 050404 (2006).

29. C. Wu, W. V. Liu, J. E. Moore, and S. Das Sarma, "Predicted quantum stripe ordering in optical lattices", cond-mat/0606743, submitted to Phys. Rev. Lett.

30. J. E. Moore and L. Balents, "Topological invariants of time-reversal-invariant band structures", cond-mat/0607314, submitted to Phys. Rev. Lett.

Theses

J. E. Moore, "Phase transitions and broken symmetries in disordered quantum Hall edge states," MIT Ph.D. thesis, defended October 3, 2000.

J. E. Moore, "The $\nu = 2/3$ spin-singlet quantum Hall state," A. B. thesis, Princeton Univ., 1995.