

Michael C. Mulligan
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Current Research Interests

- strongly correlated systems; quantum field theory
- more specifically: metallic and quantum criticality, Mott transitions, quantum Hall and topological insulator physics; entanglement in quantum systems

Employment

Postdoctoral Researcher, MIT, 2009 - Present

Education

- Stanford University, 2009

Ph.D., Physics

Advisor: Professor Shamit Kachru

- University of Illinois at Urbana-Champaign, 2000-2004

B.S., Physics, cum laude with highest distinction in discipline, 2004

Publications

- M. Mulligan, C. Nayak, and S. Kachru. “Effective Field Theory of Fractional Quantized Hall Nematics.” arXiv.1104.0256 [cond-mat].
- M. Mulligan. “Interactions and the θ Term in One-Dimensional Gapped Systems.” Phys. Rev. B **83**, 205110 (2011), arXiv.1010.6094 [cond-mat].
- M. Mulligan, C. Nayak, and S. Kachru. “Isotropic to Anisotropic Transition in a Fractional Quantum Hall State.” Phys. Rev. B **82**, 085102 (2010), arXiv.1004.3570 [cond-mat].
- B. Hsu, M. Mulligan, E. Fradkin, and E.-A. Kim. “Universal Entanglement Entropy in 2D Conformal Quantum Critical Points.” Phys. Rev. B **79**, 115421 (2009), arXiv.0812.0203 [cond-mat].
- S. Kachru, X. Liu, and M. Mulligan. “Gravity Duals of Lifshitz-like Fixed Points.” Phys. Rev. D **78**, 106005 (2008), arXiv:0808.1725 [hep-th].

- O. DeWolfe, S. Kachru, and M. Mulligan. “A Gravity Dual of Metastable Dynamical Supersymmetry Breaking.” *Phys. Rev. D* **77**, 065011 (2008), arXiv:0801.1520 [hep-th].
- D.Green, M. Mulligan, and D. Starr. “Boundary Entropy Can Increase Under Bulk RG Flow.” *Nucl. Phys. B* **798**, 491 (2008), arXiv:0710.4348 [hep-th].

Honors

- Kavli Institute for Theoretical Physics Graduate Fellow, Spring 2009
- ARCS Graduate Fellowship, 2008-2009
- National Science Foundation Graduate Research Fellowship honorable mention, 2004
- University of Illinois Liberal Arts and Sciences James Scholar, 2000-2004
- Thomas J. Watson IBM Scholarship, 2000-2004
- O’Brien-Vrba Scholarship, 2000-2004
- University of Illinois at Urbana-Champaign Robert A. Stein Physics Scholarship, 2001

Talks

Research Seminars

- *A Theoretical Realization of a Quantum Hall Nematic:*
Aspen Center for Theoretical Physics, February 4, 2011; University of New Hampshire, December 1, 2010; Oxford University, October 19, 2010; Galileo Galilei Institute for Theoretical Physics Florence, October 6, 2010.
- *An Infrared Free Nonabelian Gauge Theory in Three Dimensions:*
Harvard University, April 8, 2010; Princeton University, November 20, 2009.
- *Holography and Dynamical Critical Phenomena:*
KITP/UCSB, July 13, 2009; UC Berkeley, May 12, 2009; Nordita/Stockholm University, March 18, 2009; Cornell University, January, 16, 2009; Caltech, December 10, 2008; McGill University, October, 5, 2008.
- *A Gravity Dual of Dynamical Metastable Supersymmetry Breaking:*
SLAC/Stanford University, May 16, 2008.

Informal Group Seminars

- *The Growth of Entanglement After a Local Quench*, MIT Entanglement Meeting, Cambridge, MA, April 2010.
- *A Novel Abelian Gauge Theory*, MIT String Club, Cambridge, MA, April 2010.
- *RG Flow of a $z = 2$ Nonabelian Gauge Theory*, MIT String Club, Cambridge, MA, October 2009.

- *The Breakdown of Black Hole Thermodynamics and the Long String*, UCSB Journal Club, Santa Barbara, CA, May 2009.
- *AdS/CFT and Quantum Critical Phenomena*, Condensed Matter Journal Club, Stanford, CA, March 2008.
- *Ultraviolet Fixed Points and the Weinberg-Witten Theorem*, String Journal Club, Stanford, CA, March 2007.
- *a-Maximization and IR Fixed Points*, String Journal Club, Stanford, CA, August 2006.
- *Branes and Boundaries*, String Journal Club, Stanford, CA, April 2006.
- *Seiberg Duality*, String Journal Club, Stanford, CA, February 2006.
- *Dynamical Supersymmetry Breaking, II*, String Journal Club, Stanford, CA, January 2006.
- *Dynamical Supersymmetry Breaking, I*, String Journal Club, Stanford, CA, December 2005.
- *The Six-Vertex Model*, String Journal Club, Stanford, CA, October 2005.

Schools and Conferences Attended

- *Topological Insulators and Superconductors*, October 5 - November 18, 2011, KITP, UC Santa Barbara, CA.
- *Holographic Duality and Condensed Matter Physics*, October 5 - November 18, 2011, KITP, UC Santa Barbara, CA.
- *Workshop on Synergies between Field Theory and Exact Computational Methods in Strongly Correlated Quantum Matter*, July 2011, ICTP, Trieste, Italy.
- *Strongly Correlated Systems and Gauge/Gravity Duality*, January 31 - February 5, 2011, Aspen, CO.
- *AdS₄/CFT₃ and Holographic States of Matter*, September 27 - October 17, 2010, GGI, Florence, Italy.
- *Quantum Criticality and the AdS/CFT Correspondence*, June 29 - July 24, 2009, KITP, UC Santa Barbara, CA.
- *Critical Issues Related to Higher Temperature Superconductors*, June 15 - September 5, 2009, KITP, UC Santa Barbara, CA.
- *Spring School on Superstring Theory and Related Topics*, March 23-March 31, 2009, ICTP, Trieste, Italy.
- *Fundamental Aspects of Superstring Theory*, January 5 - June, 2009, KITP, UC Santa Barbara, CA.

- *Low-Dimensional Electron Systems*, January 18 - June 12, 2009, KITP, UC Santa Barbara, CA.
- *AdS/CFT, Condensed matter and QCD*, October 3 - 5, 2008. McGill University, Montreal, Canada.
- *Exact Methods in Low-dimensional Statistical Physics and Quantum Computing*, July 1 - 31, 2008, Les Houches School of Physics, Les Houches, France.
- *Spring School on Superstring Theory and Related Topics*, March 27 - April 4, 2008, ICTP, Trieste, Italy.
- *String Universe*, Theoretical Advanced Study in Particle Physics, June 2007, UC Boulder.
- *String Phenomenology*, September-December, 2006, KITP, UC Santa Barbara, CA.

Teaching Assistant Experience at Stanford

- Advanced Particle Mechanics, Physics 210, Aut. 2007
- Introduction to Laboratory Physics, Physics 67, Spr. 2007
- Quantum Mechanics, Physics 130, 131, 134, Aut., Win., Spr. 2005-2006, Win. 2007
- Mathematical Methods in Physics, Physics 112, Win. 2005
- Intermediate Freshman Physics, Physics 45 and 43, Aut., 2004, Spr. 2005

Personal Information

- Date and Place of Birth: April 3, 1982, Summit, New Jersey, USA.
- Citizenship: United States Citizen