**Olexei I. Motrunich**
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Date of Birth: June 5, 1976
Nationality: Ukrainian

## Education

**1996-2001** *Ph. D. in Physics*, Princeton University. Advisor: David Huse.
Thesis title: `Particle-Hole Symmetric Localization Problems in One and Two Dimensions`

**1994-1996** *B. Sc. Summa Cum Laude in Physics and Mathematics*, University of Missouri-Columbia.

**1992-1994** *Student in Physics*, Uzhgorod State University, Uzhgorod, Ukraine.

## Employment

**2006-** *Assistant Professor of Physics*, California Institute of Technology

**2004-2006** *Postdoctoral Research*, Kavli Institute for Theoretical Physics, UCSB, Santa Barbara.

**2001-2003** *Postdoctoral Research Associate*, Condensend matter theory group, MIT, with Prof. T. Senthil.

## Professional Service

Referee for professional journals (Physical Review Letters, Physical Review B).

Referee for National Science Foundation

## Awards

A. P. Sloan Foundation Fellowship (2007)

## Research and Teaching Experience

**1997-2001** *Research Assistant*, Physics Department, Princeton University, with Prof. David Huse.

**Summer 1998** *Research Assistant*, Gravity group, Physics Department, Princeton University, with Prof. Lyman Page and the MAP satellite group.

**Summer 1995, 1995-1996** *Research Experience for Undergraduate Students program*, Missouri University Research Reactor, Neutron interferometry group, with Prof. Samuel Werner.

**Spring 1995** *Research Assistant*, Mathematics Department, University of Missouri-Columbia, with Profs. Loukas Grafakos and Steven Montgomery-Smith.

**1997-1999** *Teaching Assistant*, Physics Department, Princeton University.

## Research Interests

**Strongly correlated systems:** Spin liquids and non-Fermi liquids in model and realistic systems.

**Disordered systems:** Quantum systems with strong randomness; Anderson localization in problems with special symmetries.

**Olexei I. Motrunich**

## Publications

1. A New Neutron Polarizer for Neutron Interferometry Experiments,
W.-T. Lee, O. Motrunich, B. E. Allman, and S. A. Werner, J. Phys. Soc. Jpn. **65** Suppl. A, 210 (1996).

2. Scalar Aharonov-Bohm effect with longitudinally polarized neutrons,
W.-T. Lee, O. Motrunich, B. E. Allman, and S. A. Werner, Physica B **241**, 1216 (1997).

3. Observation of scalar Aharonov-Bohm effect with longitudinally polarized neutrons,
W.-T. Lee, O. Motrunich, B. E. Allman, and S. A. Werner, Phys. Rev. Lett. **80**, 3165 (1998).

4. The effects of dynamical diffraction on the measurement of gravitationally induced quantum phase shifts by neutron interferometry,
K. C. Littrell, B. E. Allman, O. I. Motrunich, and S. A. Werner, Acta Crystallogr. A **54**, 563 (1998).

5. A sharp estimate for the Hardy-Littlewood maximal function,
L. Grafakos, S. Montgomery-Smith, and O. Motrunich, Stud. Math. **134**, 57 (1999).

6. Scalar Aharonov-Bohm effect with longitudinally polarized neutrons,
B. E. Allman, W.-T. Lee, O. I. Motrunich, and S. A. Werner, Phys. Rev. A **60**, 4272 (1999).

7. Infinite-randomness quantum Ising critical fixed points,
O. Motrunich, S. C. Mau, D. A. Huse, and D. S. Fisher, Phys. Rev. B **61**, 1160 (2000).

8. Dynamics and transport in random antiferromagnetic spin chains,
K. Damle, O. Motrunich, and D. A. Huse, Phys. Rev. Lett. **84**, 3434 (2000).

9. Dynamics and transport in random quantum systems governed by strong-randomness fixed points,
O. Motrunich, K. Damle, and D. A. Huse, Phys. Rev. B **63**, 134424 (2001).

10. Griffiths effects and quantum critical points in dirty superconductors without spin-rotation invariance: One-dimensional examples,
O. Motrunich, K. Damle, and D. A. Huse, Phys. Rev. B **63**, 224204 (2001).

11. Particle-hole symmetric localization in two dimensions,
O. Motrunich, K. Damle, and D. A. Huse, Phys. Rev. B **65**, 064206 (2002).

12. The MAP Satellite Feed Horns,
C. Barnes, M. Limon, L. Page, C. Bennett, S. Bradley, M. Halpern, G. Hinshaw, N. Jarosik, W. Jones, A. Kogut, S. Meyer, O. Motrunich, G. Tucker, D. Wilkinson, E. J. Wollack, Astrophys. J. Suppl. **143**, 567 (2002) (astro-ph/0301159).

13. Microscopic models for fractionalized phases in strongly correlated systems,
T. Senthil and O. Motrunich, Phys. Rev. B **66**, 205104 (2002)

14. Exotic order in simple models of bosonic systems,
O. I. Motrunich and T. Senthil, Phys. Rev. Lett. **89**, 277004 (2002).

15. Bosonic model with $Z_3$ fractionalization,
O. I. Motrunich, Phys. Rev. B **67**, 115108 (2003).

16. Possible effects of charge frustration in $Na_xCoO_2$: Bandwidth suppression, charge

orders, and resurrected resonating valence bond superconductivity,
O. I. Motrunich and P. A. Lee, Phys. Rev. B **69**, 214516 (2004).

17. Study of the triangular lattice tV model near x=1/3,
O. I. Motrunich and P. A. Lee, Phys. Rev. B **70**, 024514 (2004).

18. Emergent photons and transitions in the O(3) sigma model with hedgehog suppression,
O. I. Motrunich and A. Vishwanath, Phys. Rev. B **70**, 075104 (2004).

19. On the origin of artificial electrodynamics and other stories in three-dimensional bosonic models,
O. I. Motrunich and T. Senthil, Phys. Rev. B **71**, 125102 (2005).

20. Variational study of triangular lattice spin-1/2 model with ring exchanges and spin liquid state in $\kappa$-$(ET)_2$ $Cu_2$ $(CN)_3$,
O. I. Motrunich, Phys. Rev. B **72**, 045105 (2005).

21. Criticality in quantum triangular antiferromagnets via fermionized vortices,
J. Alicea, O. I. Motrunich, M. Hermele, and M. P. A. Fisher, Phys. Rev. B **72**, 064407 (2005)

22. Algebraic vortex liquid in spin-1/2 triangular antiferromagnets: Scenario for $Cs_2CuCl_4$,
J. Alicea, O. I. Motrunich, and M. P. A. Fisher, Phys. Rev. Lett. **95**, 247203 (2005).

23. Orbital magnetic field effects in spin liquid with spinon Fermi sea: Possible application to $\kappa$-$(ET)_2Cu_2(CN)_3$,
O. I. Motrunich, Phys. Rev. B **73**, 155115 (2006).

24. Theory of the algebraic vortex liquid in an anisotropic spin-1/2 triangular antiferromagnet
J. Alicea, O. I. Motrunich, and M. P. A. Fisher, Phys. Rev. B **73**, 174430 (2006).

25. Algebraic vortex liquid theory of a quantum antiferromagnet on the kagome lattice,
S. Ryu, O. I. Motrunich, J. Alicea, and M. P. A. Fisher, Phys. Rev. B **75**, 184406 (2007).

26. D-wave correlated Critical Bose Liquids in two dimensions,
O. I. Motrunich and M. P. A. Fisher, Phys. Rev. B **75**, 235116 (2007).

27. Spin solid phases of spin 1 and spin 3/2 antiferromagnets on a cubic lattice,
K. Gregor and O. I. Motrunich, Phys. Rev. B **76**, 174404 (2007).

28. Non-magnetic impurities in the spin-1/2 Kagome Antiferromagnet,
K. Gregor and O. I. Motrunich, Phys. Rev. B **77**, 184423 (2008).

29. Strong-Coupling Phases of Frustrated Bosons on a 2-leg Ladder with Ring Exchange,
D. N. Sheng, O. I. Motrunich, S. Trebst, E. Gull, and M. P. A. Fisher, Phys. Rev. B **78**, 054520 (2008).

30. Nonmagnetic impurities in a S=1/2 frustrated triangular antiferromagnet: Broadening of $^{13}C$ NMR lines in $\kappa$-$(ET)_2Cu_2(CN)_3$,
K. Gregor and O. I. Motrunich, Phys. Rev. B **79**, 024421 (2009).

31. Comparative study of Higgs transition in one-component and two-component lattice superconductor models,
O. I. Motrunich and A. Vishwanath, arXiv:0805.1494.

32. Spin, Bose, and Non-Fermi Liquid Metals in Two Dimensions: Accessing via Multi-Leg Ladders,
M. P. A. Fisher, O. I. Motrunich, and D. N. Sheng, arXiv:0812.2955.

33. Spin Bose-Metal phase in a spin-1/2 model with ring exchange on a two-leg triangular strip,
D. N. Sheng, O. I. Motrunich, and M. P. A. Fisher, Phys. Rev. B **79**, 205112 (2009).

34. Effects of impurities in Spin Bose-Metal phase on a two-leg triangular strip,
H.-H. Lai and O. I. Motrunich, Phys. Rev. B **79**, 235120 (2009).

35. Interlayer coherent composite Fermi liquid phase in quantum Hall bilayers,
J. Alicea, O. I. Motrunich, G. Refael, and M. P. A. Fisher, arXiv:0908.3199.