Curriculum Vitae
SENTHIL TODADRI

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Education

- M.Sc in Physics, Indian Institute of Technology, Kanpur, India, 1992.
- Ph.D in Physics, Yale University, 1997 .
  Thesis title: *Quantum Phase Transitions in Random Spin Systems.*
  Thesis Advisor: Prof. Subir Sachdev, Departments of Physics and Applied Physics.

Employment

- September 1992 to August 1997: Teaching Assistant, Department of Physics, Yale University.
- September 1994 to August 1997: Research Assistant, Department of Physics, Yale University.
- June - July 1997: Visiting Research Scientist, Theoretical Physics Division, Bell Laboratories.
- September 1997 to January 2001 Postdoctoral Fellow, Kavli Institute for Theoretical Physics, University of California, Santa Barbara.
- January 2001 to December 2004: Assistant Professor of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts.
- January 2005 to January 2007 (on leave from MIT): Associate Professor of Physics, Indian Institute of Science Bangalore (India).
- January 2007 to present: Associate Professor of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts.

Awards

- Josiah Willard Gibbs Fellowship for the year 1992, Yale University
- NEC Fund Award from the MIT Research Support Committee, July 2002
- Alfred P. Sloan Research Fellow, Sept. 2002- Sept. 2006.
- Research Innovation Award from The Research Corporation, May 2003.
- Outstanding Investigator Award from the Science Research Council of the Department of Atomic Energy, India, Aug 2005.
- Outstanding Young Physicist Award from the American chapter of the Indian Physics Association, March 2009

Service

- Regular referee for professional journals (Physical Review Letters, Physical Review B, Science, Nature, Europhys Lett.).
- Referee for grant proposals from the US National Science Foundation, Department of Energy, The Research Corporation.
- Organizer of 'Chez Pierre' condensed matter seminar series at MIT (Sept 2001- Dec 2004)
- Co-organizer of the MIT Physics Colloquium Sept 2001 - May 2003.
- Co-organizer of the Physics Colloquium at Indian Institute of Science Aug 2005 - December 2006.

Publications

1. Weak Mott insulators on the triangular lattice: possibility of a gapless nematic quantum spin liquid, Tarun Grover, N. Trivedi, T. Senthil, Patrick A. Lee, http://arxiv.org/abs/0907.1710.

2. Coherence and pairing in a doped Mott insulator: Application to the cuprates, T. Senthil, P.A. Lee, http://arxiv.org/abs/0904.1433 (to appear in Physical Review Letters)

3. Kondo Vortices, Zero Modes, and Magnetic Ordering in a Kondo Lattice Model, Saeed Saremi, Patrick A. Lee, T. Senthil, http://arxiv.org/abs/0903.4195.

4. Synthesis of the phenomenology of the underdoped cuprates, T. Senthil and Patrick A. Lee, Phys. Rev. B 79, 245116 (2009).

5. Mott Transition between a Spin-Liquid Insulator and a Metal in Three Dimensions, Daniel Podolsky, Arun Paramekanti, Yong Baek Kim, and T. Senthil, Phys. Rev. Lett. 102, 186401 (2009).

6. Fermi Surfaces in General Codimension and a New Controlled Nontrivial Fixed Point, T. Senthil and R. Shankar, Phys. Rev. Lett. 102, 046406 (2009).

7. Lattice models for non-Fermi-liquid metals Michael Levin and T. Senthil, Phys. Rev. B 78, 245111 (2008).

8. Monopoles in CPN-1 model via the state-operator correspondence, Max A. Metlitski, Michael Hermele, T. Senthil, and Matthew P. A. Fisher, Phys. Rev. B 78, 214418 (2008).

9. Theory of a continuous Mott transition in two dimensions, T. Senthil, Phys. Rev. B 78, 045109 (2008).

10. Critical fermi surfaces and non-fermi liquid metals, T. Senthil, Phys. Rev. B 78, 035103 (2008).

11. Topological spin Hall states, charged skyrmions, and superconductivity in two dimensions, Tarun Grover, T. Senthil, Phys. Rev. Lett. 100, 156804 (2008).

12. Angle dependent quasiparticle weights in correlated metals, Pouyan Ghaemi, T. Senthil, P. Coleman, Phys. Rev. B 77, 245108 (2008).

13. Algebraic charge liquids, Ribhu K. Kaul, Yong Baek Kim, Subir Sachdev, and T. Senthil, Nature Physics 4, 28 (2008)

14. Unconventional Transition from Superfluid to Mott Insulator Phase of Hard-Core Bosons on the Checkerboard Lattice, Arnab Sen, Kedar Damle, T. Senthil, Phys. Rev. B 76, 235107 (2007)

15. Hole dynamics in an antiferromagnet across a deconfined quantum critical point, Ribhu K. Kaul, Alexei Kolezhuk, Michael Levin, Subir Sachdev, T. Senthil, Phys. Rev. B 75, 235122 (2007)

16. Quantum spin nematics, dimerization, and deconfined criticality in quasi-one dimensional spin-1 magnets, Tarun Grover, T. Senthil, Phys. Rev. Lett. 98, 247202 (2007)

17. Higher angular momentum Kondo liquids, Pouyan Ghaemi, T. Senthil, Phys. Rev. B 75, 144412 (2007)

18. Amperean Pairing Instability in the U(1) Spin Liquid State with Fermi Surface and Application to $\kappa-(BEDT-TTF)_2Cu_2(CN)_3$, Sung-Sik Lee, Patrick A. Lee, T. Senthil, Phys. Rev. Lett. 98, 067006 (2007)

19. Possible ferro-spin nematic order in NiGa2S4, Subhro Bhattacharjee, Vijay B. Shenoy, T. Senthil, Phys. Rev. B 74, 092406 (2006).

20. Emergence of Artificial Photons in an Optical Lattice, Sumanta Tewari, V. W. Scarola, T. Senthil, S. Das Sarma, Phys. Rev. Lett. 97, 200401 (2006) .

21. On non-Fermi liquid quantum critical points in heavy fermion metals, T. Senthil, Annals of Physics, 321 (7): 1669-1681 JUL 2006

22. Spin nematics and magnetization plateau transition in anisotropic Kagome magnets, Kedar Damle, T. Senthil, Phys. Rev. Lett. 97, 067202 (2006)

23. Competing orders, non-linear sigma models, and topological terms in quantum magnets, T. Senthil, Matthew P.A. Fisher, Phys. Rev. B 74, 064405 (2006)

24. Vortex description of the fractionalized phase in exciton bose condensate, Sung-Sik Lee, T. Senthil, Patrick A. Lee, Phys. Rev. B 74, 115101 (2006)

25. Neel order, quantum spin liquids and quantum criticality in two dimensions, Pouyan Ghaemi and T. Senthil, Phys. Rev. B 73, 054415 (2006).

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

27. Fractionalization, topological order, and quasiparticle statistics, Masaki Oshikawa and T. Senthil, Phys. Rev. Lett. 96, 060601 (2006).

28. Vortices and Quasiparticles near the Superconductor-Insulator Transition in Thin Films, V. M. Galitski, G. Refael, M. P. A. Fisher, and T. Senthil Phys. Rev. Lett. 95, 077002 (2005)

29. Ordering in Cs2CuCl4: Possibility of a proximate spin liquid S. V. Isakov, T. Senthil, and Y. B. Kim, Phys. Rev. B 72, 174417 (2005).

30. Algebraic spin liquid as the mother of many competing orders, Michael Hermele, T. Senthil, Matthew P. A. Fisher, Phys. Rev. B 72, 104404 (2005)

31. Finite temperature properties of quantum Lifshitz transitions between valence bond solid phases: An example of 'local' quantum criticality, Pouyan Ghaemi, Ashvin Vishwanath, T. Senthil, Phys. Rev. B 72, 024420 (2005)

32. Origin of artificial electrodynamics in three-dimensional bosonic models, O. I. Motrunich and T. Senthil Phys. Rev. B 71, 125102 (2005)

33. Spontaneous interlayer coherence in bilayer Kondo systems, T. Senthil and M. Vojta Phys. Rev. B 71, 121102 (2005)

34. Quantum matters: Physics beyond Landau's paradigms, T. Senthil, International Journal of Modern Physics B 20 (19): 2603-2611 JUL 30 2006

35. Quantum phase transitions out of the heavy Fermi liquid, T. Senthil, Subir Sachdev, Matthias Vojta, Physica B 359-361, 9 (2005), Proceedings of SCES '04 Karlsruhe

36. Theory of the kagome lattice Ising antiferromagnet in weak transverse fields P. Nikolic and T. Senthil, Phys. Rev. B 71, 024401 (2005)

37. Cuprates as doped U(1) spin liquids, T. Senthil and Patrick A. Lee, Phys. Rev. B 71, 174515 (2005)

38. Deconfined quantum criticality and Neel order via dimer disorder M. Levin and T. Senthil, Phys. Rev. B 70, 220403 (2004)

39. Stability of U (1) spin liquids in two dimensions, M. Hermele, T. Senthil, M. P. A. Fisher, P. A. Lee, N. Nagaosa, and X.-G. Wen, Phys. Rev. B 70, 214437 (2004)

40. Deconfined criticality critically defined, T. Senthil, Leon Balents, Subir Sachdev, Ashvin Vishwanath, Matthew P. A. Fisher, (cond-mat/0404718) Proceedings of the International Conference on Statistical Physics of Quantum Systems – novel orders and dynamics, July 17-20, 2004, Sendai, Japan

41. Quantum criticality beyond the Landau-Ginzburg-Wilson paradigm, T. Senthil, L. Balents, S. Sachdev, A. Vishwanath, and M. P. A. Fisher, Phys. Rev. B 70, 144407 (2004)

42. Quantum criticality and deconfinement in phase transitions between valence bond solids, A. Vishwanath, L. Balents, and T. Senthil, Phys. Rev. B 69, 224416 (2004)

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

44. Deconfined quantum critical points, T. Senthil, A. Vishwanath, L. Balents, S. Sachdev, and Matthew P.A. Fisher, Science 303, 1490 (2004);

45. Weak magnetism and non-Fermi liquids near heavy-fermion critical points, T. Senthil, M. Vojta, and S. Sachdev Phys. Rev. B 69, 035111 (2004)

46. Physics of low-energy singlet states of the Kagome lattice quantum Heisenberg antiferromagnet, P. Nikolic and T. Senthil, Phys. Rev. B 68, 214415 (2003)

47. Fractionalized fermi liquids, T. Senthil, S. Sachdev, and M. Vojta, Phys. Rev. Lett. 90, 216403 (2003)

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

49. Projected wavefunctions for fractionalized phases of quantum spin systems, D. Ivanov and T. Senthil, Phys. Rev. **B66**, 115111 (2002).

50. Microscopic models for fractionalized phases of strongly correlated systems, T. Senthil and O. Motrunich, Phys. Rev. **B66**, 205104 (2002).

51. Fractionalization patterns in strongly correlated systems: Spin-charge separation and beyond, E. Demler, C. Nayak, H.Y. Kee, Y.B. Kim, and T. Senthil, Phys. Rev. **B65**, 155103 (2002).

52. Electron fractionalization and cuprate superconductivity, T. Senthil, cond-mat/0105104 (to appear in special issue of Indian Journal of Physics).

53. The electron spectral function in two dimensional fractionalized phases, C. Lannert, Matthew P.A. Fisher, and T. Senthil, Phys. Rev. **B64**, 014518 (2001); cond-mat/0101249.

54. Detecting fractions of the electron in the high-T_c materials, T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B64**, 214511 (2001).

55. Fractionalization, topological order, and cuprate superconductivity, T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B63**, 134521 (2001.

56. Quantum confinement transition in a d-wave superconductor, C. Lannert, Matthew P.A. Fisher, and T. Senthil, Phys. Rev. B **63**, 134510 (2001).

57. Fractionalization and confinement in the $U(1)$ and Z_2 gauge theories of strongly correlated systems, T. Senthil and Matthew P.A. Fisher, J. Phys. **A34**, No. 10, L119 (2001).

58. Fractionalization in the cuprates: Detecting the topological order, T. Senthil and Matthew P.A. Fisher, Phys. Rev. Lett. **86**, 292 (2001).

59. Luttinger Liquid Physics in the superconductor vortex core, Ashvin Vishwanath and T. Senthil, Phys. Rev. **B63**, 14506 (2001).

60. Quantum confinement transition and cuprate criticality, T. Senthil and Matthew P.A. Fisher in "More is Different: Fifty years of Condensed Matter Physics", N. -Phuan Ong and Ravin Bhatt, ed., Princeton University Press, April 2001.

61. Z_2 gauge theory of electron fractionalization in strongly correlated systems, T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B62**, 7850 (2000) ;

62. Quasiparticle localization in superconductors with spin-orbit scattering, T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B61**, 9690 (2000).

63. Superconducting "metals" and "insulators", S. Vishveshwara, T. Senthil, and Matthew P.A. Fisher, Phys. Rev. **B61**, 6966 (2000).

64. The spin quantum Hall effect in unconventional superconductors, T. Senthil, J.B. Marston, and Matthew P.A. Fisher, Phys. Rev. **B60**, 4245 (1999).

65. Quasiparticle density of states in dirty high-T_c superconductors, T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B60**, 6893 (1999).

66. Quasiparticle transport and localization in high-T_c superconductors, T. Senthil, Matthew P.A. Fisher, Leon Balents, Chetan Nayak, Phys. Rev. Lett., **81**, 4704 (1998)

67. Properties of the random field Ising model in a transverse magnetic field, T. Senthil, Phys. Rev. **B57**, 8375 (1998)

68. Higher dimensional realizations of activated dynamic scaling at random quantum transitions, T. Senthil and Subir Sachdev, Phys. Rev. Lett., **77**, 5292 (1996)

69. Zero temperature phase transitions in quantum Heisenberg ferromagnets, Subir Sachdev and T. Senthil, Annals of Physics, 251, 76 (1996)

70. Phase transition of a Bose gas in a harmonic potential, K. Damle, T. Senthil, S.N. Majumdar, and S. Sachdev, Europhysics Letters, **36** (1), 7 (1996)

71. Critical properties of random quantum Potts and Clock models, T. Senthil and S.N. Majumdar, Phys. Rev. Lett. **76**, 3001 (1996)

72. Finite temperature properties of quantum antiferromagnets in an external magnetic field, S. Sachdev, T. Senthil, and R. Shankar, Phys. Rev. **B50**, 258 (1994)

73. Quantum phase transitions in frustrated quantum antiferromagnets, Andrey V. Chubukov, Subir Sachdev, and T. Senthil, Nucl. Phys. **B 426** FS, 601 (1994)

74. Universal magnetic properties of frustrated quantum antiferromagnets in two dimensions, Andrey V. Chubukov, T. Senthil, and Subir Sachdev, Phys. Rev. Lett., **72**, 2089 (1994)