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Faculty

SENTHIL TODADRI

Professor

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Related Links:

- Senthil Todadri's Home Page
- Condensed Matter Theory Group at MIT
- Chez Pierre Seminars in Condensed Matter Physics

Area of Physics:

Condensed Matter Theory

Research Interests

In the last several years, a number of materials have been found whose properties do not seem to fit in simply with conventional theories of the physics of solids. Striking examples are the materials that display the remarkable phenomenon of high-temperature superconductivity, but there are many others as well. Strong interactions between the electrons in the solid and/or the presence of impurities play a crucial role in determining the properties of these materials. Professor Todadri's research interests are in understanding theoretically the phenomena that could and do arise in such circumstances.

More specifically, his most recent interests have been in developing a theoretical framework to describe electrons in metals that celebrated cannot be understood within the paradigm of Landau's celebrated Fermi liquid theory. In previous work he initiated the study of deconfined quantum critical points, and developed the theory of fractionalized phases of matter where the electron has broken apart. Professor Todadri has also worked on the theory of electron localization due to impurities in various circumstances.

Biographical Sketch

Senthil Todadri joined MIT in January 2001 as an Assistant Professor of Physics, and received tenure in early 2007. Before that, he had spent a few years as a postdoctoral fellow at the Institute for Theoretical Physics in Santa Barbara, CA. His graduate degree is from Yale University, and undergraduate from the Indian Institute of Technology, Kanpur. He was

promoted to Full Professor in July 2011.

Selected Publications

- "Fractionalization, topological order, and cuprate superconductivity," T. Senthil and Matthew P.A. Fisher, Phys. Rev **B63**, 134521 (2001).
- "Z2 gauge theory of electron fractionalization in strongly correlated systems," T. Senthil and Matthew P.A. Fisher, Phys. Rev. **B62**, 7850 (2000).
- "The spin quantum Hall effect in unconventional superconductors," T. Senthil, J.B. Marston, and Matthew P.A. Fisher, Phys. Rev. **B60**, 4245 (1999).
- "Quasiparticle transport and localization in high-Tc superconductors," T. Senthil, Matthew P.A. Fisher, Leon Balents, Chetan Nayak, Phys. Rev. Lett. **81**, 4704 (1998).
- "Higher dimensional realizations of activated dynamic scaling at random quantum transitions," T. Senthil and Subir Sachdev, Phys. Rev. Lett. **77**, 5292 (1996).

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