Physics Colloquium

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"Statistical mechanics of metals without quasiparticles, and of charged black holes"

The very successful theory of metals is based upon a Boltzmann equation for electronic quasiparticles. But the "strange metals" found in high temperature superconductors do not have well-defined quasiparticle excitations, which raises the problem of a theory of electrical transport in such metals. In their quantum theory of charged black holes, Gibbons and Hawking applied the Boltzmann-Gibbs ensemble to the Einstein-Maxwell theory, and obtained results for black hole entropy which did not have an evident interpretation in terms of the eigenstates of a quantum Hamiltonian. I will describe progress in resolving these long-standing problems in very different fields of physics using insights from the solvable Sachdev-Ye-Kitaev model of fermions with random interactions.

Subir Sachdev was educated at the Indian Institute of Technology, Delhi, the Massachusetts Institute of Technology, and Harvard University. He has held professional positions at Bell Labs, Yale University, and Harvard where he is now the Herchel Smith Professor of Physics. During 2021-22 he is also the Maureen and John Hendricks Distinguished Visiting Professor at The Institute for Advanced Study, Princeton. He has been elected to national academies of science in India and the U.S. and is a recipient of a number of awards and honors which include the Dirac Medal from the International Center for Theoretical Physics, and the Lars Onsager Prize from the American Physical Society.

Thursday, March 3, in LL 316 at 4:25 PM

For Zoom participation, please see information below:

Meeting ID: 972 1274 7894

Passcode: 631869