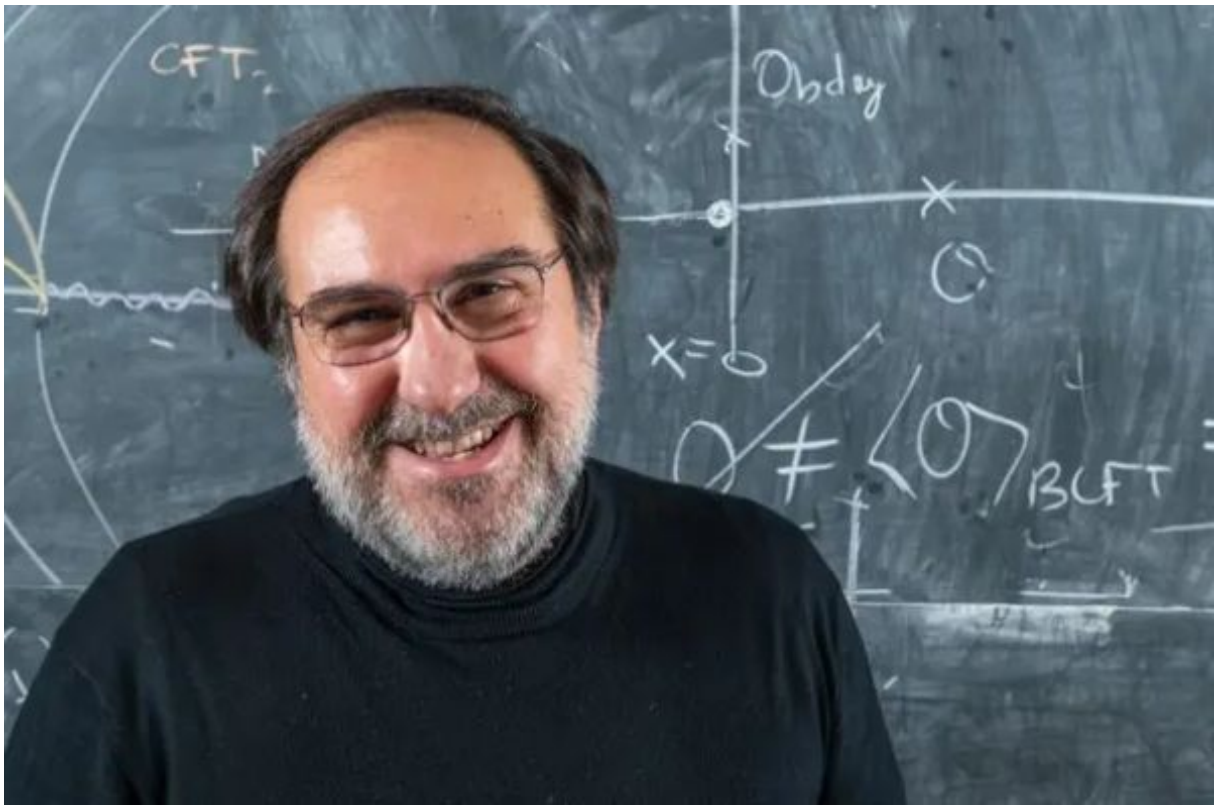


INSIGHT SEMINAR: Disorder and interactions in quantum systems

THIERRY GIAMARCHI

May 18, 2026
12:00 to 13:00
Elements Room

As discovered in the seminal paper of P. W. Anderson in 1958 when an equation such as the Schroedinger equation is subjected to a random potential the nature of the solutions changes drastically going from plane waves to localizes states. An important question is what happens to this phenomenon when instead of looking at the properties of one single particle one wants to deal with a large number of interacting quantum particles, as is relevant for several experimental realizations, both in cold atomic gases and in condensed matter.
I will give in this talk an overview of this class of phenomena, with questions ranging from the phases that can be reached in such interacting disordered systems to the consequences for the transport properties, and finally the delicate question of the role of the temperature, in presence or absence of a thermal bath. I will also discuss what happens for other classes of potentials than the plain disorder, such as quasiperiodic potentials, or colored noise, both

from a theoretical perspective but also in contact with recent experiments in cold atomic gases. I will point to the challenges in the field.

ABSTRACT:

As discovered in the seminal paper of P. W. Anderson in 1958 when an equation such as the Schroedinger equation is subjected to a random potential the nature of the solutions changes drastically going from plane waves to localizes states. An important question is what happens to this phenomenon when instead of looking at the properties of one single particle one wants to deal with a large number of interacting quantum particles, as is relevant for several experimental realizations, both in cold atomic gases and in condensed matter.

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BIO:

Thierry Giamarchi is a distinguished physicist known for his research in quantum matter physics. He holds a Ph.D. in physics from Paris XI University and has been a permanent member of France's CNRS since 1986. Giamarchi's work has led to the discovery of new disordered phases such as Bose glass and Bragg glass. He has been a full professor at the University of Geneva and has served on various scientific boards and committees. His research focuses on the effects of interactions in low-dimensional quantum systems and the combined effects of disorder and interactions in both classical and quantum systems. Giamarchi is a fellow of the American Physical Society and a member of the French Academy of Sciences.

Hosted by: Prof. Dr. Leticia Tarruell