

Friday, 17.04.2026, 1:15 p.m.
in Lecture Hall **ROT (0.056)**

Thierry Giamarchi
University of Geneva, Switzerland

„The bizarre one-dimensional quantum physics“

To describe the materials that surround us and that we use daily, quantum physics has proven to be an essential tool. Through a description largely based on a physics without interaction between particles, it has allowed to understand many properties of materials. However, this description without interaction has its limitations, and understanding the effects of interactions represents a huge challenge. In the case of systems that are one-dimensional, the interactions between particles even lead to a radically new physics compared to what we are familiar with in three-dimensional systems. What may seem like nothing more than a mathematical game or an academic curiosity is, in fact, extremely important for many systems existing in condensed matter or cold atomic gases. The need to understand such systems has now become a central point in the physics of quantum systems, both in terms of the physics itself and in terms of the methods for solving such problems.

In this presentation, I will provide an overview of this very particular physics and its consequences, such as the existence of fractional charge excitations and topological phase transitions. I will also showcase the experimental scenarios that recent advancements in materials science, nanotechnology, and ultracold gas physics have offered, in particular with the possibility to perform quantum simulations of such problems and discuss the state of the field and its prospects and challenges for the 21st century.

Everybody is welcome, especially students of all semester

