

Théorie conforme des champs et systèmes quantiques à plusieurs corps
21 août – 9 septembre 2022

Conformal field theory and quantum many-body physics
August 21 – September 9, 2022

Benjamin Doyon
(King's College London)

**Non-equilibrium steady states and fluctuations in quantum
many-body systems (I,II,III,IV)**

Finding general principles that go beyond the well developed thermodynamic theory of equilibrium is one of the most important challenges of current research. As thermodynamics is a theory for extensive quantities such as the energy, and its fluctuations in space, one looks for a parallel theory that asks about quantities that are spatially transported, say from left to right, over time: currents and their fluctuations. In this series of lectures, I will develop a number of topics to answer some of these questions. I will restrict to the context of two-dimensional spacetime for simplicity, going over the basic ideas and exact results in conformal field theory (CFT) and integrable systems. Topics covered will be: (1) Non-equilibrium steady states in many-body quantum systems that admit ballistic transport. (2) Fluctuations of transported quantities at large times using the large-deviation framework. (3) The relation between static and dynamic fluctuations, and the entanglement entropy and its growth after quenches. As time permits, I will overview hydrodynamic techniques, twist fields techniques, and, in CFT, conformal welding techniques for large-deviation functions.