Atelier
« Au-delà de l'intégrabilité : les mathématiques et la physique de l'intégrabilité et sa brisure dans les phénomènes quantiques à basses dimensions fortement corrélés »
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Workshop
"Beyond integrability: The mathematics and physics of integrability and its breaking in low-dimensional strongly correlated quantum phenomena"
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Far-from-equilibrium transport in many-body quantum systems

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In comparison to the well-established subject of equilibrium thermodynamics, physics out of equilibrium is much less understood. A family of states that have the potential for a powerful theoretical description is that of non-equilibrium steady states. These do not change macroscopically with time, but support steady flows, be it of charges, particles, or energy. There has been a lot of progress in their study within classical dynamics, and more recently quantum dynamics. In many-body quantum systems the interest stems from the interplay between non-equilibrium physics and many-body behaviours, such as those captured by quantum field theory or those associated to integrability. I will explain some exact results for far-from-equilibrium ballistic transport especially at or near criticality in one and higher dimensions. These results involve a variety of many-body concepts: the Lieb–Robinson bound for the velocity of propagation of information, chiral factorization in one dimension, (generalized) local Gibbs thermalization and the eigenstate thermalization hypothesis, shock waves and fluid dynamics, and gauge-gravity duality.

This is based on works done in collaborations with Denis Bernard, with Olalla Castro-Alvaredo, Yixiong Chen and Marianne Hoogeveen, and with Joe Bhaseen, Andrew Lucas and Koenraad Schalm.

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