Quantum correlations and non-Gaussian operations

Mattia WALSCHAERS

CNRS, Laboratoire Kastler Brossel

mattia.walschaers@lkb.upmc.fr

Non-Gaussian features such as a high stellar rank and Wigner negativity have been identified as necessary resources for reaching a quantum computation advantage in sampling problems. It is thus important to understand how these resources can be created and distributed in experiments. The first part of the talk will focus on the measurement-based generation of Wigner negativity. We will show that if Alice and Bob share a Gaussian state, a measurement on Alice's subsystem can only create Wigner negativity in Bob's systems if there is quantum steering from Bob to Alice. We also highlight that quantum steering is no longer a necessary resource when Alice and Bob share a more general non-Gaussian state. This shows that non-Gaussian effects thus require specific quantum correlations to be created. In the second part of the talk, we will flip things around and show how non-Gaussian operations can also modify or even create quantum correlations. We will discuss techniques to detect such non-Gaussian quantum correlations and finally argue that they may be important for reaching a quantum computational advantage.