

COLLOQUIA DI DOTTORATO, A.A. 2022/2023

Dipartimento di Fisica, A101 Giovedì 16 Marzo 2023 ore 16:00

The device-independent scenario: quantum information processing based on Bell Theorem

Antonio Acín

(ICFO, Institute of Photonic Sciences, Barcelona)

The 2022 Nobel prize in Physics has acknowledged the fundamental role of Bell's theorem in physics. It is well understood that the experimental demonstration of the theorem implies the existence of quantum correlations, often known as nonlocal, that cannot be described by classical theories, in which measurement outcomes are predetermined.

In recent years, Bell nonlocal correlations have also acquired the status of information resource, as they are crucial for the construction of quantum information protocols in the device-independent scenario, where no modelling of the devices is assumed in the implementation. Because of this absence of modelling, device-independent protocols offer the strongest form of security attainable in quantum theory.

This seminar provides an introduction to all these concepts, going from quantum foundations to quantum information science and back. The main concepts and tools in the device-independent formalism are explained, together with an overview of the main results and remaining challenges.

The seminar is in presence up to the maximum occupancy of the lecture hall.