

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

*Thursday, 19 September 2024 11:00 (2 hours)*

Bell's theorem proves the existence of quantum correlations, often known as Bell nonlocal, that cannot be described by classical theories, in which measurement outcomes are predetermined. In recent years, Bell non-local 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 modeling of the devices is assumed in the implementation. Because of this absence of modeling, device-independent protocols offer the strongest form of security attainable in quantum theory. This lecture provides an introduction to all these concepts, going from quantum foundations to quantum information science and back. The main ideas and tools in the device-independent formalism are explained, together with an overview of the main results and remaining challenges.

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