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## Quantum technologies for future scientific research

Thursday, 14 February 2019 09:00 (1h 30m)

In this lesson, we briefly review the basics of quantum information theory and some of the most promising applications of quantum technologies for future research. In particular, we present the achievements and the challenges obtained by quantum simulators, dedicated quantum hardware built to simulate interesting but hardly accessible physics: from models to study for high-Tc superconductors or topological systems, critical systems, quantum chemistry or lattice gauge theories where Monte Carlo methods efficiency is hindered by the sign problem. In particular, we present the first experimental quantum simulations of lattice gauge theories. Alongside, we present the tensor network methods, a powerful classical numerical approach that promise to become a powerful tool accompanying future quantum simulations and computations, providing guidance, benchmarking and verification of the quantum results.

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