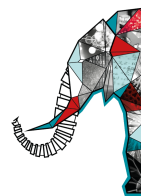


25<sup>e</sup> Congrès Général  
de la Société Française  
de Physique 



Contribution ID: 158

Type: **Orale**

## Quantum Simulation

*Wednesday, 10 July 2019 14:00 (30 minutes)*

The quantum simulation program was introduced by Richard Feynman in a 1981 visionary paper. In these early days of computers, Feynman raised the simple but profound question: can one simulate a collection of interacting quantum systems with computers? Noticing the exponential growth of the Hilbert space with the number of particles, Feynman suggested to realize analog quantum simulators to gain information on complex many-body physics problems. These are ubiquitous in Nature, and encountered in condensed matter systems, nuclear physics and neutron stars, as well as in high energy physics.

Thanks to recent developments in the control of individual quantum systems on the one hand, and to advances in theoretical quantum information on the other hand, the field of quantum computing and quantum simulation is experiencing today a spectacular growth. Numerous academic groups as well as private companies are active in this research field characterized by a variety of experimental platforms to address quantum many-body problems.

In this presentation we will first review the basic concepts of quantum simulation and outline similarities and differences with a universal quantum computer. We will discuss the current quantum simulation platforms ranging from trapped ions and cold atoms, to cryogenic Josephson junctions and photonic systems. We will give a few examples of recent results. Open questions and challenges in this field will finally be outlined.

### Choix de session parallèle

4.3 Simulateurs quantiques

**Primary author:** SALOMON, Christophe (Ecole Normale supérieure)

**Presenter:** SALOMON, Christophe (Ecole Normale supérieure)

**Session Classification:** Séance Parallèle