

Mercoledì
29 aprile
Aula B, ore 15:30

Quantum complexity in gravity,
quantum field theory and
quantum information science

Quantum complexity quantifies the difficulty of preparing a state or implementing a unitary transformation with limited resources. Applications range from quantum computation to condensed matter physics and quantum gravity. I seek to bridge the approaches of these fields, which define and study complexity using different frameworks and tools. In this talk, I will describe several definitions of complexity, along with their key properties. In quantum information theory, I will focus on complexity growth in random quantum circuits. In quantum many-body systems and quantum field theory (QFT), I will discuss a geometric definition of complexity in terms of geodesics on the unitary group. In dynamical systems, I will explore a definition of complexity in terms of state or operator spreading. I will also outline applications to quantum many-body models, and QFTs including conformal field theories (CFTs). Finally, I will explain the proposed relationship between complexity and gravitational observables within the holographic anti-de Sitter (AdS)/CFT correspondence.



Stefano Baiguera

