

ICFO⁺ Training and Development Program

OCT

Introduction to lattice gauge theories

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Course Outline

Gauge theories are of fundamental importance to understand completely different states of matter ranging from particle physics to strongly correlated materials. However, lattice gauge theories are not only important to understand quantum matter, but recently became also particularly relevant for quantum information processing. We begin this lecture series with a thorough discussion of the theoretical framework necessary for lattice gauge theories. In particular we will discuss discrete and continuous symmetries, as well as Abelian and non-Abelian symmetries. In condensed matter physics, gauge theories appear as effective descriptions of interacting many-body systems, whereas in particle physics gauge invariance is usually postulated as a fundamental principle of nature. In these theory lectures we will discuss both viewpoints and will illustrate the phenomenology of specific lattice gauge theories. Finally, we will discuss the exciting prospect of quantum simulation with current experiments.

Calendar

- Tuesday 6th October 10:00 – 12:00 via Teams
- Tuesday 13rd October 10:00 – 12:00 via Teams
- Tuesday 20th October 10:00 – 12:00 via Teams
- Tuesday 27th October 10:00 – 12:00 via Teams

