

Scuola tematica "Modern Trends in Pure and Applied Mathematics"



Contribution ID: 19

Type: not specified

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Thursday, 29 May 2025 09:00 (45 minutes)

Abstract

While the theory of quantum mechanics describes interactions between the fundamental constituents of matter at microscopic scales, these interactions can lead to fascinating effects at the macroscopic level. Understanding the emergence of these phases from the microscopic description of quantum systems is a fundamental yet highly challenging mathematical problem. In this course, we will explore this challenge in the case of the interacting Bose gas, a system whose low-temperature phases exhibit the so-called Bose-Einstein condensation phenomenon (Nobel Prize, 2001), a phase of matter in which particles remain confined purely due to quantum effects. No prior knowledge of quantum mechanics will be assumed.