

## Appunti di Fisica '23

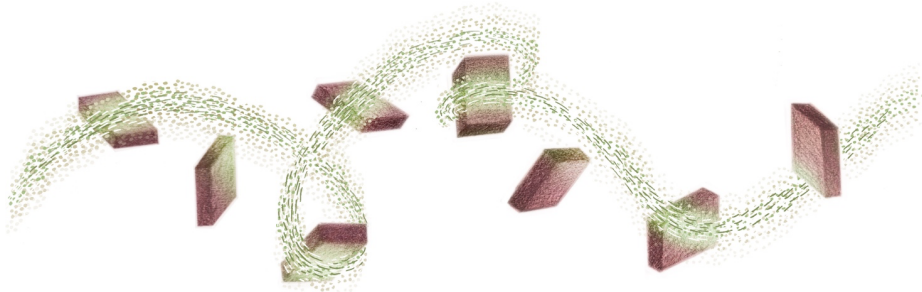
20 dicembre, ore 15:00

Sala Seminari, CNR-IPCF

### The interaction of light with matter (and viceversa)

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How is light propagation shaped by microscale structures? And how microstructured illuminations can influence the dynamics of microscale objects? In this talk, these two questions are addressed as follows:

**Side A** | we start by discussing the interaction of light with microscale architectures. First, we show that biological systems—from bacteria colonies to plants and animals—achieve bright colourations through engineered microstructures. We focus on how microstructures with different degrees of order—from crystals to disordered architectures—are exploited to achieve the desired appearance, without employing pigments. Second, we translate what we learnt from nature to fabricate bioinspired materials made of biocompatible and biodegradable polymers.

**Side B** | in this part, we discuss the other side of the coin: how does a microstructured illumination influence the motion of active matter? Active matter labels systems that take energy from the environment to perform an action. Bacteria colonies, bird flocks, and

human crowds are a few examples of active systems. The study of active matter is an interdisciplinary task crucial to comprehend, for example, the formation of biofilms and the spread of infections. However, an understanding of the behaviour of active systems in complex environments is missing—hindering their use in practical and fundamental problems. Here, we propose to use synthetic active particles (Janus colloids) in a complex light field (speckle) as a model system to study the collective dynamics of active systems in realistic environments.

In the conclusions, the two parts are brought together and future perspectives on reconfigurable microstructures made of active components are discussed.

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