



UNIVERSITÀ  
DEGLI STUDI  
DI MILANO

Università degli Studi di Milano  
Department of Physics "Aldo Pontremoli" - **Aula Caldirola**



**Friday 13<sup>th</sup>** February 2026, 14:00

## From neurons to matter: what does it mean to compute biologically?

**Dr. Alberto Gatti** - Neurological Institute Foundation Casimiro Mondino (IRCCS) Pavia, Italy

Biological neural systems compute without explicit algorithms or centralized control. This seminar explores how computation emerges from neuronal and population dynamics, stochasticity, non-linearity and plasticity, with explicit neuro-physiological reference to the pathways and processing of a sensory stimulus, from its first contact with the surface of a sensory organ to a coherent brain representation. These principles can provide useful abstractions and a meaningful framework for in materia-computing, leveraging self-assembled systems. The goal is to provide a hint about what "biological computation" really means, beyond metaphor.

**Monday 16<sup>th</sup>** February 2026, 11:30

## Writing and erasing mechanical memory in soft solids

**Dr. Paolo Edera** - CNRS and École Supérieure de Physique et de Chimie Industrielles de la Ville de Paris, Paris, France

In everyday life, we often encounter materials whose mechanical response cannot be described as that of either ideal solids or ideal liquids. Mud, toothpaste, mayonnaise, and many other soft materials behave elastically when subjected to small shear stresses, but transition to a flowing state once the applied stress exceeds a material-dependent threshold known as the yield stress. These out-of-equilibrium systems store information about their deformation history within their mechanical properties. By combining nonlinear mechanical testing with particle-scale dynamical simulations, I will show how, in a model soft solid, the yield-stress memory can be written, read, and reset.

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