



UNIVERSITÀ
DEGLI STUDI
FIRENZE

“Nanophononics: from phonon confinement to topological protection”

PROGRAMME

11:30 Colloquium

13:00 Lunch with the speaker (all participants are invited at LENS)

Enrico Fermi Colloquium



Friday 20th October
2023 11:30

LENS - Via Nello Carrara 1
Sesto F.no (Firenze)

Conference room Querzoli



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ABSTRACT

Phonons are less common in the scientific discourse compared to electrons and photons. Yet, they offer the potential for low energy information transport, suitable for advanced interconnects, which will be addressed here. Starting with phonon confinement in free-standing ultra-thin Si membranes, exploring engineering of dispersion relations to obtain functional 2D phononic crystals, I will illustrate how progress has been made coupling phonons to photons in optomechanical systems towards phonon sources and waveguides in the GHz range. A variety of designs will be explained using the interplay between phonons and photons as well as phonon transport and localisation. I will conclude with our recent endeavours to achieve topological protection in phononic waveguides. We based our designs in the Valley Hall effect, achieving Dirac cones, opening the band gap and realising gap modes. Our experimental work is anchored in scalable Si-based laboratory-scale devices operating at room temperature. The results to be presented arise from years-long collaborative research.

Klein Colloquium by Nicoletta Granchi: “Near-field imaging of correlated disordered photonic structures”

