

# Cavity-enhanced superconductivity

*Introduce:*

Claudio Giannetti, Università Cattolica del Sacro Cuore

*Interviene:*

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## Abstract

Strong light-matter interactions are playing an increasingly crucial role in the understanding and engineering of new states of matter with relevance to the fields of quantum optics, quantum information, solid state physics and materials science. In this talk, we discuss how the superconducting transition temperatures of certain high-temperature inorganic (YBCO) and organic superconductors (Rb3C60) can be modified by coupling phonons to the vacuum electromagnetic field of a cavity or plasmonic structure. This is enabled by a novel cooperative effect based on the presence of a strongly coupled vibrational environment allowing for an efficient dressing of the otherwise weakly coupled phonon bands of these compounds. We provide a simple model for the case of organic superconductors. If time remains, we will discuss how similar cooperative effects can be exploited to generate strong non-linearities at the single-particle level in the regime of collective light-matter strong coupling.

[1] A. Thomas et al, "Exploring superconductivity under strong coupling with the vacuum electromagnetic field", arXiv:1911.01459 (2019)

## Seminario

**Lunedì 16 dicembre 2019**

**Sala Riunioni, ore 12.00**

Via dei Musei 41 - Brescia

