

## Tera-Days: Attività INFN e prospettive per la radiazione THz e le sue applicazioni



SAPIENZA  
UNIVERSITÀ DI ROMA



Contribution ID: 15

Type: **not specified**

# Nonlinear optical effects and third-harmonic generation in superconductors: Cooper pairs versus Higgs mode contribution

*Wednesday, 5 April 2017 17:00 (30 minutes)*

The recent observation of a transmitted THz pulse oscillating at three times the frequency of the incident light paves the way to a powerful protocol to access resonant excitations in a superconductor. Here we show that this nonlinear optical process is dominated by light-induced excitation of Cooper pairs, while the collective amplitude (Higgs) fluctuations of the superconducting order parameter give in general a negligible contribution. We also predict a nontrivial dependence of the signal on the direction of the light polarization with respect to the lattice symmetry, which can be tested in systems such as, e.g., cuprate superconductors.

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**Session Classification:** Fundamental Physics at THz and sub-THz