UNIVERSITÀ DEGLI STUDI DI TORINO

Dipartimento di Fisica

Seminar Announcement

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Tunable Josephson THz oscillators based on High-Temperature superconductors

Tuesday, 17 September 2019, h. 11.00

Sala Wataghin, Physics Department, via P. Giuria 1, Torino

The speaker

Vladimir Krasnov received his Ph.D. degree in Physics and Mathematics from Institute of Solid State Physics, Chernogolovka Russia in 1995. After postdoc positions at Technical University of Denmark and Chalmers University of Technology, Sweden, he worked as assistant professor (200-2004) and senior lecturer (2004-2005) at Chalmers U.T. In 2005 he became a professor in Experimental Condensed Matter Physics at Stockholm University. His research is focused at the study of mesoscopic phenomena in condensed matter physics with emphasis on Josephson electronics, high-temperature superconductivity, magnetism and nanotechnology.

Summary

High-temperature superconductor $Bi_2Sr_2CaCu_2O_{8+\delta}$ can be viewed as a stack of atomic scale intrinsic Josephson junctions. When voltage is applied to such a single crystal, it starts to generate various types of bosons (photons, phonons, polaritons, magnons, plasmons) in a variety of different ways. In this talk I will overview our recent results on both Josephson and non-Josephson emission from small $Bi_2Sr_2CaCu_2O_{8+\delta}$ mesas, which allow tunable operation in a record wide frequency range 0.1-13 THz. This includes the ac-Josephson emission of electromagnetic waves 1-11 THz, piezoelectric emission of phonons and polaritons and non-equilibrium boson (plasmon or magnon) emission upon relaxation of nonequilibrium quasiparticles. Those effects are important both for applied research, e.g., creation of tunable, compact, continuous wave and monochromatic THz source with a frequency span in the whole "THz gap" region and beyond 0.1-15 THz, and for fundamental understanding of the mechanism of pairing in high-temperature superconductors.

Ref. Marco Truccato