Seminar Announcement

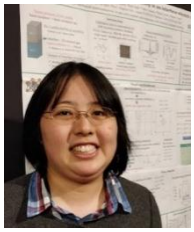
Dr. Yuri Fukaya

Okayama University, Japan

Anomalous Josephson coupling and high-harmonics in noncentrosymmetric superconductors with *S*-wave spin-triplet pairing

Friday, 7 March 2025, h. 13.30

Room "Avogadro", Physics Department, via P. Giuria 1, Torino



The speaker

Yuri Fukaya is a theorist working on superconductivity as an assistant professor in Okayama University. She has 10 years of experience on the theory of superconductivity. She was a Postdoctoral fellow in CNR-SPIN institute/University of Salerno.

Abstract

Breaking of inversion symmetry in low dimensionality offers a unique possibility for the design of unconventional superconducting phases including topological states. In this framework, the 2D electron systems in $SrTiO_3$ based heterostructures are ideal platforms to explore noncentrosymmetric multiorbital superconductivity due to the tunability of the critical temperature by electrostatic gating, etc. Such aspect together with the unconventional experimental findings for oxides interface pose fundamental questions not yet fully settled about the nature of the superconducting phase and its interrelation with the orbital degrees of freedom.

We investigate the topological superconductivity and the current-phase relation (CPR) of Josephson junction consisting of multiorbital noncentrosymmetric superconductors (NCS) marked by orbital Rashba coupling and isotropic interorbital spin-triplet pairing with topological character. For NCS-NCS junction, a 0-π transition is achieved only in the regime of high-transparency and for a given electron density mismatch among the superconductors forming the junction. While the emergence of a dominant second harmonic in the CPR is often encountered in superconductor-ferromagnet-superconductor heterostructures, for multiorbital NCS Josephson junction we unveil the path to design high harmonics CPR without breaking time-reversal symmetry.

Ref. Marco Truccato