Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Odd-frequency superconductivity in superconducting junctions"

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Abstract: In general, according to the Fermi statistics, superconductivity is classified into four symmetry classes: even-frequency spin-singlet even-parity state, even-frequency spin-triplet odd-parity state, odd-frequency spin-triplet even-parity state, and odd-frequency spin-singlet odd-parity state. Here, even- or odd-frequency means symmetry of superconductivity with respect to imaginary time or frequency. Recently, it has been clarified that odd-frequency pairings can be realized in superconducting junctions.

In this talk, I will discuss manifestation of odd-frequency pairings emerging in superconducting junctions. I will show that when odd-frequency pairings dominate, the density of states has a zero energy peak rather than a gap, and Meissner effect can be negative (paramagnetic). In the presence of spin-orbit interactions, Meissner response can change its sign depending on orientation of the applied field. I will also discuss experiments demonstrating these predictions.

References:
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J. Linder, T. Yokoyama, A. Sudbo, and M. Eschrig, Phys. Rev. Lett. 102, 107008 (2009)
T. Yokoyama, Y. Tanaka, and N. Nagaosa, Phys. Rev. Lett. 106, 246601 (2011)
C. Espedal, T. Yokoyama, and J. Linder, Phys. Rev. Lett. 116, 127002 (2016)

12:00pm
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Low Room (6C-333)

Host: Hiroki Isobe