Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Odd-frequency pairing in superconducting heterostructures . A.A. GOLUBOV, University of Twente, The Netherlands, Y. TANAKA, T. YOKOYAMA, Nagoya University, Japan, Y. ASANO, Hokkaido University, Japan — We present a general theory of the proximity effect in junctions between unconventional superconductors and diffusive normal metals (DN) or ferromagnets (DF). We consider all possible symmetry classes in a superconductor allowed by the Pauli principle: 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. For each of the above states, symmetry and spectral properties of the induced pair amplitude in the DN (DF) are determined. The cases of junctions with spin-singlet s- and d-wave superconductors and spin-triplet p-wave superconductors are adressed in detail. We discuss the interplay between the proximity effect and midgap Andreev bound states arising at interfaces in unconventional (d- or p-wave) junctions. The most striking property is the odd-frequency symmetry of the pairing amplitude induced in DN (DF) in contacts with p-wave superconductors. This leads to zero-energy singularity in the density of states and to anomalous screening of an external magnetic field. Peculiarities of Josephson effect in d- or p-wave junctions are discussed. Experiments are suggested to detect an order parameter symmetry using heterostructures with unconventional superconductors.

A.A. Golubov
University of Twente, The Netherlands

Date submitted: 20 Nov 2006 Electronic form version 1.4