

A solitary superconductivity in layered ferromagnet-superconductor heterostructures

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Abstract

© Published under licence by IOP Publishing Ltd. An electron-electron interaction in a ferromagnet (F) was neglected in The standard approach to The proximity effect theories for The layered FS structures (here S is used for a superconductor). Actually this interaction exists, but it is suppressed by strong exchange field and can reveal itself if an exchange fields of adjacent F layers compensate each other. In The clean FS structures limit The preceding consideration of this interaction could explain a surprisingly high critical temperature T_c in The short-periodic Gd/La superlattice. Here we analyze this problem for dirty case based on The Usadel equations solutions changing parameters of asymmetrical FS systems (thicknesses of layers, boundary transparencies, etc). Taking into account an electron-electron interaction leads to an appearance of hidden superconductivity of F layers which can manifest itself in The proximity effect conditions. It is especially expressed if magnetizations in F layers have opposite signs. The solitary superconductivity is also predicted for asymmetrical dirty FSF trilayers.

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