20 YEARS OF EXCELLENCE IN INTERNATIONAL MEETINGS
alliedacademies.com

2nd International Conference on

MAGNETISM AND MAGNETIC MATERIALS

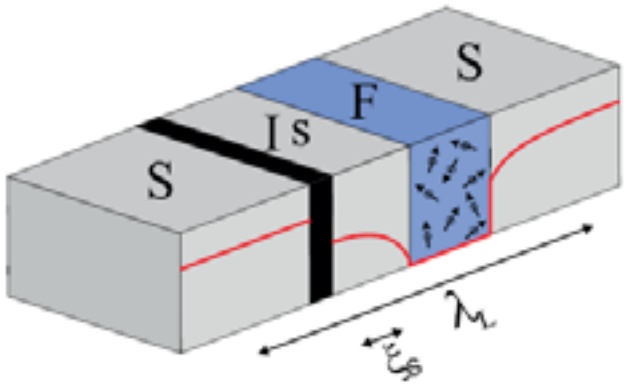
September 24-26, 2018 | Budapest, Hungary

Mater Sci Nanotechnol 2018, Volume 2

STATIC AND DYNAMIC PROPERTIES OF JOSEPHSON JUNCTIONS WITH COMPOSITE INSULATOR-SUPERCONDUCTOR-FERROMAGNETIC INTERLAYER

Sergey Bakurskiy
Lomonosov Moscow State University, Russia

Nowadays the Josephson junctions with magnetic weak links attract special attention due to their possible applications several future devices, such as superconducting MRAM, logic, quantum bits and neural networks. The interaction between superconducting and ferromagnetic orders in the proximized area of ferromagnetic SFS junctions provides phenomenon of 0- π oscillation of pairing amplitude in the structure. The effect permits to organize superconducting memory devices in new principals. The S-IsF-S junction with composite interlayer consists of tunnel barrier I, thin superconducting film s and ferromagnetic layer F combines high performance of the tunnel SIS junctions and special properties of magnetic SFS devices. We developed a microscopic theory of the electron transport in these devices in the frame of the Usadel equations. We have found that 0- π transition in SisFS junction can be hidden from the direct measurement its current-phase relation (CPR), due to formation of multiple branches in the CPR shape. We demonstrate that the effect is the direct consequence of the significant second harmonic in CPR of the ferromagnetic sFS part of the SisFS device. This fact significantly modifies modes of operation of the structure. Furthermore, we predict the appearance of the superconducting phase domains in the thin superconductive layer s near the domain walls in ferromagnetic material. The properties of the superconducting phase domains have hysteretic nature and depend on the direction of injected current inside the structure.



Schematic design of SIsFS Josephson junction.