



Crossovers between superconducting symmetry classes

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(Submitted on 20 Jun 2011)

We study the average density of states in a small metallic grain coupled to two superconductors with the phase difference π , in a magnetic field. The spectrum of the low-energy excitations in the grain is described by the random matrix theory whose symmetry depends on the magnetic field strength and coupling to the superconductors. In the limiting cases, a pure superconducting symmetry class is realized. For intermediate magnetic fields or couplings to the superconductors, the system experiences a crossover between different symmetry classes. With the help of the supersymmetric sigma-model we derive the exact expressions for the average density of states in the crossovers between the symmetry classes A-C and CI-C.

Comments: 6 pages

Subjects: **Disordered Systems and Neural Networks (cond-mat.dis-nn)**; Mesoscale and Nanoscale Physics (cond-mat.mes-hall); Superconductivity (cond-mat.supr-con); Mathematical Physics (math-ph)

Journal reference: Pis'ma v ZhETF 94, 240 (2011); JETP Lett. 94, 222 (2011)

DOI: [10.1134/S0021364011150057](https://doi.org/10.1134/S0021364011150057)

Cite as: **arXiv:1106.3863 [cond-mat.dis-nn]**
(or **arXiv:1106.3863v1 [cond-mat.dis-nn]** for this version)

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