



量子物理学・ナノサイエンス第 40 回特別セミナー

Spin-dependent coupling between quantum dots and topological quantum wires

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概 要

Considering Rashba quantum wires with a proximity-induced superconducting gap as physical realizations of Majorana fermions and quantum dots, we calculate the overlap of the Majorana wave functions with the local wave functions on the dot. We determine the spin-dependent tunneling amplitudes between these two localized states and show that we can tune into a fully spin polarized tunneling regime by changing the distance between dot and Majorana fermion. Upon directly applying this to the tunneling model Hamiltonian, we calculate the effective magnetic field on the quantum dot flanked by two Majorana fermions. The direction of the induced magnetic field on the dot depends on the occupation of the nonlocal fermion formed from the two Majorana end states which can be used as a readout for such a Majorana qubit.

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