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Giant magnetization of superconductor - two-dimensional electron gas - superconductor structure.[1] EDUARD BOGACHEK, IGOR ROMANOVSKY, UZI LANDMAN, School of Physics, Georgia Institute of Technology, Atlanta, Georgia 30332-0430, ILYA KRIVE, Institute for Low Temperature Physics and Engineering, Lenin ave. 47, Kharkov 61103, Ukraine — Superconductivity-induced phase-controlled mesoscopic magnetic effects in two-dimensional semiconductor quantum wires bridged between two superconductors are considered. Giant paramagnetic response of the contact to the applied magnetic field at certain resonant values of the phase difference of the order parameter is predicted. This resonant behavior of the magnetization is a result of the change in the population of the $2N_\perp$-fold degenerate Andreev levels near the Fermi energy ($N_\perp$ is the number of transverse modes in the quantum wire). The magnetic response at the resonances at low temperatures is proportional to the number of transverse modes and, if the the number of transverse modes is large, the total magnetization of the junction may achieve values large enough to be experimentally detectable.

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Igor Romanovsky
School of Physics, Georgia Institute of Technology
Atlanta, Georgia 30332-0430

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