

Photogalvanic phenomena in superconductors supporting intrinsic diode effect

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Abstract

We suggest a phenomenological theory of photogalvanic phenomena in superconducting materials and structures revealing the diode effect. Starting from a generalized London model including the quadratic nonlinearity in the relation between the supercurrent and superfluid velocity, we show that the electromagnetic wave incident on the superconductor can generate a nontrivial superconducting phase difference between the ends of the sample. Being enclosed in a superconducting loop, such a phase battery should generate a dc supercurrent circulating in the loop. By increasing the electromagnetic wave intensity one can provoke the switching between the loop states with different vorticities.

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