Magnetization generated by microwave-induced Rashba interaction

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We show that a controllable dc magnetization is accumulated in a junction comprising a quantum dot coupled to nonmagnetic reservoirs if the junction is subjected to a time-dependent spin-orbit interaction. The latter is induced by an ac electric field generated by microwave irradiation of the gated junction. The magnetization is caused by inelastic spin-flip scattering of electrons that tunnel through the junction, and depends on the polarization of the electric field: a circularly polarized field leads to the maximal effect, while there is no effect in a linearly polarized field. Furthermore, the magnetization increases as a step function (smoothened by temperature) as the microwave photon energy becomes larger than the absolute value of the difference between the single energy level on the quantum dot and the common chemical potential in the leads.

[1] O. Entin-Wohlman, R. I. Shekhter, M. Jonson, and A. Aharony, Magnetization generated by microwave-induced Rashba interaction, Phys. Rev. B 102, 075419 (2020); (arXiv:2007.04122).