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Spin-orbit coupling effects and the angular dependence of the tunneling anisotropic magnetoresistance[1] ALEX MATOS-ABIAGUE, MARTIN GMITRA, JAROSLAV FABIAN, University of Regensburg — We consider a tunnel junction in which one of the electrodes is ferromagnetic. Based on general properties and symmetry considerations, we develop a phenomenological model in which the anisotropy of the tunneling magnetoresistance with respect to the magnetization orientation of the ferromagnet originates from the spin-orbit interaction. The model reveals how the symmetry and angular dependence of the tunneling anisotropic magnetoresistance (TAMR) are determined by the form of the spin-orbit coupling field (SOCF), independently of the specific details of the system. We investigate the particularly important cases in which the SOCF is of Bychkov-Rashba and/or Dresselhaus type and obtain angular dependences which are in good agreement with available TAMR measurements. We also predict new forms of the angular dependence of the TAMR by exploring different geometric configurations.

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