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Ferromagnetism and current-controlled magnetization of nanomagnets with giant magnetic anisotropy BANG-GUI LIU, Institute of Physics, Chinese Academy of Sciences, Beijing 100080, China & Beijing National Laboratory for Condensed Matter Physics, Beijing 100080, — Because the giant uniaxial magnetic anisotropy is advantageous in keeping the spins stable for practical applications in information processing and storage, we study ferromagnetism of nanomagnets with giant uniaxial magnetic anisotropy and how to control their magnetization by injecting a spin-polarized current. The giant anisotropy leads to a barrier for reversing a spin. We use kinetic Monte Carlo method to simulate the spin dynamics. We obtain the experimental ferromagnetism and its temperature dependence with experimental parameters. The ferromagnetism is formed because the nanomagnets are limited in space and the experimental duration is finite in time. Furthermore, we design a special nanomagnet and study its magnetization reversal under applied spin-polarized currents. We observe a hysteresis loop against the current. Starting from whatever value, the magnetization can be controlled by the spin-polarized current. Y Li and B-G Liu: Phys. Rev. Lett. 96, 217201 (2006); Phys. Rev. B 73, 174418 (2006).

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