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【604】 Micro- and nanomagnet stray field investigation for manipulation of spin qubits

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The stray field of micromagnets is currently exploited to manipulate the spin state of electrons confined in semiconductor quantum dots. The manipulation performance depends on the magnetization pattern, which is often assumed to be uniform in the development of micromagnet designs. We question this assumption by comparing micromagnetic simulations and spin qubit experiments and analyze the effect of fabrication-induced defects and material properties. We also map the out-of-plane stray field of iron micromagnets by SQUID microscopy, finding large driving gradients (> 1 mT/nm) but also non-negligible variations (> 5 mT) along the surface of the magnets due to magnetocrystalline anisotropy, surface roughness and incomplete magnet saturation.

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