Towards nanoMRI with mechanical resonators

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Abstract
Carbon nanotubes and graphene offer unique scientific and technological opportunities as nanoelectromechanical systems (NEMS). Namely, they allow the fabrication of mechanical resonators that can be operated as exceptional sensors of mass and force. The mass resolution can be as low as 1.7 yg, which is about the mass of 1 proton [1]. The force sensitivity can reach ~1 zN/Hz$^{1/2}$ [2,3]. Such a force sensitivity may enable the detection of single nuclear spins by placing the resonator in a strong gradient of magnetic field. Here, I will review our efforts towards the detection of single nuclear spins and the realization of nano magnetic resonance imaging (nanoMRI).

References
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