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Detecting Few Electron Spins by Magnetic Resonance Force Microscopy with Potential Application for Donor Mapping in Semiconductor KIN CHUNG FONG, PALASH BANERJEE, YURI OBOUKHOV, DENIS PELEKHOV , P. CHRIS HAMMEL, Physics Department, Ohio State University — We report measurements of the statistical polarization of small electron spin ensembles by Magnetic Resonance Force Microscopy (MRFM). The experiments were conducted at $T = 4$ K using an IBM-style ultrasoft micromechanical cantilever outfitted with a high coercivity micromagnetic probe. Magnetic resonance signals from tens of electron spins with spin-correlation time of ~ 400 ms are obtained. In order to apply MRFM for spatial mapping of donor electrons in semiconductors, non-contact friction between the cantilever and the silicon surface is investigated. We found the combination of hydrogen passivation, gold coating, and shielding the sample surface from stray laser light reduces the non-contact friction by almost a factor of 100.

Kin Chung Fong
Physics Department, Ohio State University

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