Abstract Submitted
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Nanoscale magnetometry of dynamic magnetization[1] JOOST VAN BREE, MICHAEL FLATTÉ, University of Iowa — We propose a novel scheme for sensing magnetic properties of materials using the energy stored in the magnetic field of a nearby (scanning) probe. In conventional scanning probe magnetometry a sample perturbs a probe through a magnetic field external to its volume, limiting it to samples with static moments. In our proposed scheme we overcome this limitation by reversing the perturbation; the probe's magnetic field generates a response of the sample, which acts back on the probe and changes its energy. Taking a nitrogen vacancy (NV) spin center in diamond as the probe, we show theoretically this back action effectively changes the fine structure splitting of the spin ground state. Sensitive measurement techniques using coherent detection schemes would then permit detection of the magnetic response of paramagnetic and diamagnetic materials. Not only would this technique extend the class of materials that can be sensed compared to conventional magnetometry, we also show it could be used to measure the thickness of magnetically dead layers with better than $0.1\mathring{A}$ accuracy.

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