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Approach to Dipolar Field Microscopy CARLOS MERILES, WEI DONG, PHILLIP STALLWORTH, CUNY - City College of New York — Nuclear Magnetic Resonance (NMR) is arguably one of the most powerful techniques available today to characterize diverse systems. However, the low sensitivity of the standard detection method constrains the applicability of this technique to samples having effective dimensions not less than a few microns. Here, we propose a novel scheme and device for the indirect detection of the nuclear spin signal at a submicroscopic scale. This approach – for which the name Dipolar Field Microscopy (DFM) is suggested – is based on the manipulation of the long-range nuclear dipolar interaction created between the sample and a semiconductor tip located close to its surface. After a preparation interval, the local magnetization of the sample is used to modulate the nuclear magnetization in the semiconductor tip, which, in turn is determined by an optical inspection. Based on results previously reported, it is shown that, in principle, images and/or localized high-resolution spectra of the sample can be retrieved with spatial resolution proportional to the size of the tip. These calculations are accompanied by recent proof-of-principle experimental results in a model system.

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