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SQUID-detected magnetic resonance imaging in zero static magnetic field N. KELSO, S-K. LEE, L. BOUCHARD, V. DEMAS, A. PINES, J. CLARKE, UC Berkeley and LBNL — Conventional magnetic resonance imaging (MRI) is performed in a static homogenous magnetic field B_0 in the presence of applied field gradients that generate a magnetic field change $\Delta B << B_0$ across the sample. In this case, the concomitant gradients can be ignored and the applied gradients are unidirectional. When $\Delta B \sim B_0$, this approximation breaks down and the concomitant gradients distort the image. In the limit $B_0 \rightarrow 0$ these distortions can be eliminated by means of a pulse sequence consisting of a train of short, spatially uniform magnetic field pulses. Between the pulses, the spins evolve in a pure gradient field (with zero spatial average). The effect of the pulse train is to average out the concomitant terms to leave an effectively unidirectional gradient field (Meriles *et al.*, *PNAS* 102, 1840 (2005)). We acquire magnetic signals with a superconducting gradiometer coupled to the input loop of a low-transition temperature superconducting quantum interference device. Using this pulse sequence we have acquired undistorted two-dimensional images of methanol phantoms in a residual static field < 1 μT. Supported by USDOE..

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