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MRI at 132 μT for the Detection of Tumors[1] SARAH BUSCH, MICHAEL MÖßLE, MICHAEL HATRIDGE, IN HWAN LEE, UC Berkeley/LBNL, KEVIN CHEW, JEFF SIMKO, UC San Francisco, ALEX PINES, JOHN CLARKE, UC Berkeley/LBNL — We are investigating the use of magnetic resonance imaging (MRI), typically at 132 μT, with enhanced longitudinal-relaxation-time (T_1)-weighted contrast to detect tumors. We have measured T_1 of healthy and cancerous prostate tissue specimens–within a few hours of their surgical removal–from approximately 20 patients. The measurements involve a field-cycling imaging technique in which we prepolarize protons in fields up to 150 mT. After this field has been ramped down, the image of each pair of samples is encoded using magnetic field gradients, and the proton nuclear magnetic resonance signal is measured using a SQUID coupled to an untuned, second-derivative gradiometer. The observed T_1 contrast is significantly greater than that at (say) 1.5 T, suggesting that one may be able to distinguish tumors from healthy tissue without a contrast agent: average T_1 values at 132 μT for healthy and cancerous prostate tissue are 60 and 46 ms. We describe a 150-mT prepolarizing coil that will allow the system to be reconfigured in a geometry suitable for in vivo imaging of human prostates.

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