Abstract Submitted
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Discrete Two-Level Systems Coupled to a Tunable High Q Superconducting Microwave Resonator[1] KRISTEN VOIGT, J. HERTZBERG, Z. KIM, J. HOFFMAN, J. GROVER, J. LEE, S. RAVETS, JQI/UMD, M. HAFEZI, J. TAYLOR, JQI/NIST/UMD, A. CHOUDHARY, UMD, J. ANDERSON, JQI/UMD, C. LOBB, JQI/NIST/UMD, L. OROZCO, S. ROLSTON, F. WELLSTOOD, JQI/UMD — We have developed a tunable "lumped-element" thin-film superconducting Al microwave resonator [1] and used it for measuring two level systems. The device is intended for coupling to the hyperfine splitting of trapped ^{87}Rb atoms at 6.83 GHz. By moving a superconducting Al pin towards the inductor of the resonator using a piezo stage, we can tune the resonance over a range of 130 MHz. We measure the system by weakly coupling to an on-chip transmission line. At 12 mK the quality factor is typically 100,000. While holding the tuning pin at a fixed position, we can also apply a dc voltage to the transmission line. We observe small reproducible shifts of the resonance frequency as the voltage is changed. These shifts are more pronounced at lower power, which suggests the effect is attributable to discrete charged two-level systems in the sapphire substrate or surface Al oxide. We discuss our results and the characteristics of the underlying two-level systems.

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