Abstract Submitted
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Nonlinear Single Spin Spectrum Analyzer SHLOMI KOTLER[1], NITZAN AKERMAN, YINNON GLICKMAN, ROEE OZERI, Weizmann Institute of Science — Qubits have been used as linear spectrum analyzers of their environments, through the use of decoherence spectroscopy. Here we solve the problem of nonlinear spectral analysis, required for discrete noise induced by a strongly coupled environment. Our nonperturbative analytical model shows a nonlinear signal dependence on noise power, resulting in a spectral resolution beyond the Fourier limit as well as frequency mixing. We develop a noise characterization scheme adapted to this nonlinearity. We then apply it using a single trapped ion as a sensitive probe of strong, non-Gaussian, discrete magnetic field noise. Finally, we experimentally compared the performance of equidistant vs Uhrig modulation schemes for spectral analysis. Phys. Rev. Lett. 110, 110503 (2013). Synopsis at http://physics.aps.org/synopsis-for/10.1103/PhysRevLett.110.110503

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