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Spin Noise Spectroscopy Beyond Thermal Equilibrium and Linear Response[1] NIKOLAI SINITSYN, Theoretical Division, Los Alamos National Laboratory, PHILIPP GLASENAPP, Experimentelle Physik, Technische Universität Dortmund, D-44221 Dortmund, Germany, DIBYENDU ROY, Max Plank Institute and Theoretical Division, Los Alamos National Laboratory, D.G. RICKEL, National High Magnetic Field Lab, Los Alamos National Laboratory, ALEX GREILICH, M. BAYER, Experimentelle Physik, Technische Universität Dortmund, D-44221 Dortmund, Germany, LUYI YANG, SCOTT CROOKER, National High Magnetic Field Lab, Los Alamos National Laboratory — Per the fluctuation-dissipation theorem, the information obtained from spin fluctuation studies in thermal equilibrium is necessarily constrained by the system's linear response functions. However, by including weak radio frequency magnetic fields, we demonstrate that intrinsic and random spin fluctuations even in strictly unpolarized ensembles can reveal underlying patterns of correlation and coupling beyond linear response, and can be used to study nonequilibrium and even multiphoton coherent spin phenomena. We demonstrate this capability in a classical vapor of 41K alkali atoms, where spin fluctuations alone directly reveal Rabi splittings, the formation of Mollow triplets and Autler-Townes doublets, ac Zeeman shifts, and even nonlinear multiphoton coherences.

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