

Abstract Submitted
for the 4CF14 Meeting of
The American Physical Society

Cross-correlation spin noise spectroscopy of heterogeneous interacting spin systems NIKOLAI SINITSYN, DIBYENDU ROY, LUYI YANG, SCOTT CROOKER, Los Alamos National Laboratory — We develop a minimally invasive approach for characterization of inter-species interactions in heterogeneous spin systems by detecting spin fluctuations alone. We consider two spin ensembles in thermal equilibrium that interact via binary exchange coupling and determine cross-correlations between the intrinsic spin fluctuations exhibited by the two spin species. Our theoretical predictions are experimentally confirmed using “two-color” optical spin noise spectroscopy on a mixture of interacting Rb and Cs alkali vapors. The results allow us to explore the rates of spin exchange and total spin relaxation under conditions of strict thermodynamic equilibrium.

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Date submitted: 10 Aug 2014

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