Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Revealing spin-spin correlations in atomic vapors and semiconductor heterostructures using spin noise spectroscopy[1] DIBYENDU ROY, Center for Nonlinear Studies and Theoretical Division, Los Alamos National Laboratory, NIKOLAI A. SINITSYN, Theoretical Division, Los Alamos National Laboratory — We discuss advantages and limitations of the spin noise spectroscopy for characterization of spin-spin correlations in various atomic vapors and semiconductor heterostructures. It is shown that all the relevant parameters of the quantum dot molecules including tunneling amplitudes with spin-conserving and spin-non-conserving interactions, decoherence rates, Coulomb repulsions, anisotropic g-factors and the distance between the dots can be determined by measuring properties of the spin noise power spectrum using a single linearly polarized detuned continuous-wave laser beam. Next we show that spin-spin interactions between two different species in an atomic vapor mixture can be revealed by measuring spin noise power spectrum with two laser beams. Finally we mention some relevant advances in spin noise spectroscopy for characterization of many-body interactions in correlated materials.

[1]This work was supported by the National Nuclear Security Administration of the U.S. DOE at LANL under Contract No. DE-AC52-06NA25396, and the LDRD Program at LANL

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Date submitted: 14 Nov 2013 Electronic form version 1.4