

Spin noise spectroscopy in coupled dual-species atomic vapors

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We will discuss spin-noise correlations that spontaneously build up due to spin-exchange collisions in a dual-species atomic vapor [1]. While in [1] we observe positive spin-noise correlation, a similar measurement [2] reported both positive and negative correlations, such that the total cross-correlation noise power is zero. We will show that magnetic gradients can turn what are genuinely positive into negative correlations. We will further elaborate on the subtle and partly understood quantum measurement aspects of spin-noise in hot atomic vapors in order to clarify the theoretical foundations of these measurements.

[1] A. T. Dellis, M. Loulakis and I. K. Kominis, Spin-noise correlations and spin-noise exchange driven by low-field spin-exchange collisions, *Physical Review A*, **90**, 032705 (2014).

[2] D. Roy, L. Yang, S. A. Crooker and N. A. Sinitsyn, Cross-correlation spin noise spectroscopy of heterogeneous interacting spin systems, *Scientific Reports* **5**, 9573 (2015).