

Spin Self-Rephasing and Very Long Coherence Times in a Trapped Atomic Ensemble

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Reference:

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We perform Ramsey spectroscopy on the ground state of ultracold 87Rb atoms magnetically trapped on a chip in the Knudsen regime. Field inhomogeneities over the sample should limit the 1/e contrast decay time to about 3 s, while decay times of 58 ± 12 s are actually observed. We explain this surprising result by a spin self-rephasing mechanism induced by the identical spin rotation effect originating from particle indistinguishability. We propose a theory of this synchronization mechanism and obtain good agreement with the experimental observations. The effect is general and may appear in other physical systems.

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