Long-lived spin squeezing in a metrologically relevant regime

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Abstract

Spin squeezing is a fascinating manifestation of many-particle
entanglement as well as one of the most promising quantum technologies.
In a collaboration between SYRTE and LKB, we have built an experiment combining a trapped-atom clock on an atom chip with a fibre Fabry-Perot microcavity to generate spin squeezing. This has enabled us to produce spin-squeezed states with a lifetime on the order of a second, two orders of magnitude longer than previous experiments. We have observed spin-squeezed states with p to 8.1(9) dB of metrological squeezing in a cloud of $2×104$ultracoldalkaliatomsbyquantumnondemolition(QND)measurement.Observingthetimee

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