Atom localization via Ramsey interferometry: A coherent cavity field provides a better resolution

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Abstract: We investigate the position localization of a polarized atom interacting with an off-resonant quantized standing-wave field. We show that a coherent cavity field achieves a higher resolution than a classical field. An almost perfect localization is possible when the atom passes through several identically prepared cavities.

Index Keywords: Electromagnetic fields; Interferometry; Mathematical models; Quantum theory; Atom field interaction; Atom localization; Coherent cavity field; Ramsey interferometry; Standing wave; Atoms

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