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Improving coherent population amplitudes in open Λ-systems
VISHAL SHAH1, SVENJA KNAPPE, PETER SCHWINDT, LEO HOLLBERG, JOHN KITCHING, Time and Frequency Division, The National Institute of Standards and Technology, Boulder, CO, USA — A novel scheme based on optical pumping for transforming open Λ-systems to closed Λ-systems is proposed and is experimentally implemented on a sample of $^{87}$Rb atoms confined in a vapor cell. A seven-fold improvement in the amplitude of a coherent population trapping (CPT) resonance is observed at sufficient light intensities. The density matrix formalism is used to derive an analytic expression that highlights the differences between a closed and an open Λ-system in CPT and its consequences on the performance of atomic clocks are discussed.

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