

Abstract Submitted  
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**Cooling in a Bistable Optical Cavity** ILYA AVERBUKH, MARK VILENSKY, YEHIAM PRIOR, Weizmann Institute of Science, Rehovot, Israel — We propose a new approach to non-resonant laser cooling of atoms and molecules based on their interaction with a bistable cavity supporting a standing wave mode. The bistability may be induced by an external feedback loop, or by intracavity nonlinear optical elements. The method exemplifies a photonic version of Sisyphus cooling, in which the matter-dressed cavity extracts energy from the particles and discharges it to the external field as a result of sudden transitions between two stable states. In contrast to the conventional cavity cooling, in which atoms experience a viscous-type force, the bistable cavity imitates “dry friction”, and stops the atoms much faster. We provide an analytical estimate for the stopping force, consider numerically the cooling of an ensemble of particles in a bistable cavity, and discuss the prospects of our method for cooling micromechanical resonators.

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