

Abstract Submitted
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Cavity QED with Quantized Center of Mass: Correlation Functions, Tunneling, and Entanglement¹ PERRY RICE, MAMBWE MUMBA, DYAN JONES, LUIS OROZCO, NICK CUMMINGS, University of Maryland — For an atom in a driven cavity with an external potential, we examine nonclassical correlations and entanglement. The effects of center of mass motion including tunneling are included. We find a very sensitive dependence of various correlation functions on center of mass motion. We obtain analytic results in the case of a harmonic potential, or that of a lattice potential that has half the wavelength of the driving field. It may be possible to use the sensitivity of these correlation functions to yield information about atomic motion, such as Levy flights for example. Further we find that two cross correlations between transmitted and fluorescent light yield information about the entanglement in the system. Also, we discuss inequalities between intensity-intensity and intensity-field correlations in this system, and find nonclassical behavior of a new type.

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