

Abstract Submitted  
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**Nonclassical State Revealed in a Fully Classical Harmonic System**

WAYNE HUANG, Texas A&M University — In 1947, the measurement of Lamb and Retherford on the hyperfine spectrum of the hydrogen atom gave the first experimental evidence of the electromagnetic vacuum field. The interaction between matter and the vacuum field has since become an important topic in fundamental quantum electrodynamics. In this presentation, I would like to first discuss the excitation spectrum of a classical harmonic oscillator immersed in the vacuum field. Both our numerical simulation and perturbation analysis indicate that such a classical system exhibits the same excitation spectrum as its quantum counterpart. Then, I would like to show preliminary results on realizing the “non-classical states” within such a classical scheme. Namely, upon excitation the classical harmonic oscillator in the vacuum field displays interesting dynamical properties that are analogous to a coherent state, a squeezed state, and a Schrodinger cat state of a quantized light field. The intriguing connection between the classical harmonic system and the quantized light field may find application in the generation of nonclassical light using nano/optomechanical systems.

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