

Abstract Submitted  
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**Quantum fluctuations in small lasers** KAUSHIK ROY CHOUDHURY, STEPHAN HAAS, A.F.J LEVI, University of Southern California — Master equations are used to demonstrate the dominant role of quantum fluctuations in determining the steady-state and transient response of a laser when there is a small number of particles in the system. In this regime, quantum fluctuations are found to suppress the lasing threshold and create a non-Poisson probability distribution for  $n$  discrete excited electronic states and  $s$  discrete photons. The correlation between  $n$  and  $s$  damps the averaged dynamic response of laser emission. Random walk calculations verify the master equation predictions and are used to connect to systems containing larger numbers of particles.

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