

Abstract Submitted  
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**Quantum theory of cavityless feedback cooling of an optically trapped nanoparticle**<sup>1</sup> BRANDON RODENBURG, MISHKAT BHATTACHARYA, Rochester Institute of Technology, LEVI NEUKIRCH, A. NICK VAMIVAKAS, University of Rochester — We consider the optomechanics of sub-wavelength dielectric particles optically trapped in free space, as realized in recent experiments in several groups. We present a theoretical model, specifically a Markovian master equation, that treats both the mechanical and optical degrees of freedom quantum mechanically. Using this equation, we discuss optical feedback cooling of the nanoparticle, with emphasis on preparation of the mechanical ground state.

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