

Abstract Submitted
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Quantum theory of atom lasers TOBIAS KRAMER, Physics Department, Harvard University, MIRTA RODRIGUEZ PINILLA, Clarendon Laboratory, University of Oxford, UK, CHRISTIAN BRACHER, Physics Department, Bryn Mawr College, Bryn Mawr, PA — Quantum theory of atom lasers We present a fully quantum mechanical and largely analytical theory for the properties of coherent atomic beams in the gravitational field. The results describe both the total emission rate and the beam profile. Depending on the size of the atomic cloud and the strength of interactions, the theory predicts a transverse substructure in the atomic beam. A simple picture in terms of a virtual point source allows us to describe interaction effects analogous to the effect of an optical lens. Recent experiments on atom laser beam profiles are in good agreement with the model. For more information, see also <http://people.deas.harvard.edu/~tkramer>

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