

Abstract Submitted
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Cold Atoms in three-dimensional Confinement formed by Gravity and Atomic Mirrors ALICE QUAN, DANIEL ERENZO, Middle Tennessee State University, REETA VYAS, University of Arkansas — We have presented a theoretical study of three dimensional matter-wave cavity made of atomic mirrors operating with low intensity evanescent waves with gravity playing a central role in keeping a stable trajectory for cold atoms inside the cavity. The cavity consists of a vertical cylindrical atomic mirror providing a radial confinement with a plane atomic mirror at the bottom and gravity at the top providing the vertical confinement. We have studied cold atoms in such cavity where the dynamics is controlled by gravity. We determine exact energy eigenfunctions (cavity modes) and the distribution of the corresponding energy levels in such kind of confinement for the center of mass motion. Then we studied the overlap of the cavity modes with a condensate described by a three dimensional Gaussian function. A comparison of the exact quantum result with a classical result is also presented.

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