

Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

How to create macroscopic superposition states of cold bosons in an asymmetric double well¹ MIGUEL-ÁNGEL GARCÍA-MARCH, LINCOLN CARR, Colorado School of Mines — The quantum models of the behavior of cold bosons in a double well attribute self trapping of an initial maximal population imbalance, i.e. all atoms localized initially in one of the wells, to exponentially long tunneling times. We show that this self trapping can also be attributed to the presence of a small tilt. Nevertheless, when the tilt is increased this tunneling reappears periodically for certain resonant values of the tilt. The higher the value of the resonant tilt is, the higher the deviations around it the initial state supports without self trapping in one of the wells and the quicker the period of the tunneling is. Therefore, a properly prepared tilt around one of the resonances allows the experimental observation of the quantum sloshing of the atoms initially localized in one of the wells. We show that macroscopic superposition states, that take the form of NOON or NOON-like states, are realized periodically along the quantum sloshing of the cold bosons, thus paving the way for their experimental observation.

¹Supported by Fulbright Foundation, Spanish Ministry of Science and Education (MEC), and NSF

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Date submitted: 27 Jan 2010

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