Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Macroscopic superposition states of cold bosons in an asymmetric double well with Orbital Degrees of freedom[1] MIGUEL-ÁNGEL GARCÍA-MARCH, LINCOLN CARR, Colorado School of Mines — We extend previous studies on cold bosons in double well potentials using a Hubbard-like Hamiltonian to two and three dimensions and relax the one-level assumption. We consider a tilted potential and all regimes, from a weak barrier to a strong barrier. We discuss the properties of Macroscopic Superposition (MS) states, i.e. NOON or NOON-like states, with a non-zero orbital angular momentum in such a Hamiltonian. We find that, as in the one dimensional case, these states are very sensitive to small imperfections in a symmetric potential. Despite their fragility, MS states with angular momentum reappear periodically as the tilt between both wells is increased. The tunneling dynamics of different initial states, ranging from maximal population imbalance in the lower level, to maximal population imbalance in the higher one, is also discussed. Intermediate situations include a variety of populations of both levels and maximal population imbalance in each one.

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

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Date submitted: 26 Jan 2010 Electronic form version 1.4