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Self-trapped dynamics in 2D optical lattice SHUMING LI, Department of Physics, University of Colorado at Boulder, RAFAEL HIPOLITO, Department of Physics, Boston University, JEAN-FELIX RIOU, DAVID WEISS, Physics Department, The Pennsylvania State University, University Park, ANA-TOLI POLKOVNIKOV, Department of Physics, Boston University, ANA REY, JILA & Department of Physics, University of Colorado at Boulder — We will discuss a mean field model to study the expansion of an array of one dimensional vertical tubes of cold bosonic atoms confined in a two dimensional optical lattice after the crossed dipole trap used for the initial loading is suddenly turned off. The method uses a Lagrangian formalism to derive Newtonian-like equations of motion that include tunneling between wells and nonlinear mean field effects due to atomic interactions. In our model, the pure mean field dynamics predicts macroscopic selftrapping manifested in accumulation of atoms at the edge of the cloud and formation of a hole at the center. When quantum fluctuations are counted for, the self-trapping is considerably suppressed, and the predictions of the model are in better agreement with the recent experiment measurements.

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