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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, ANATOLI 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 self-trapping 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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