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Self-trapped dynamics in a 2D optical lattice SHUMING LI, JILA & Department of Physics, University of Colorado, 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, Boulder — We use 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. In our model the pure mean field dynamics predicts macroscopic self trapping manifested in the accumulation of atoms at the edge of the cloud and the formation of a hole at the center. When quantum fluctuations are accounted for, the localization of the wave packet is enhanced, the formation of the hole is suppressed, and the predictions of the model are in better agreement with the experimental measurements.

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