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Self-Trapping dynamics in a 2D optical lattice SHUMING LI, JILA & Department of Physics, University of Colorado, Boulder, AARON REINHARD, JEAN-FELIX RIOU, LAURA ADAMS, Physics Department, The Pennsylvania State University, University Park, RAFAEL HIPOLITO, ANATOLI POLKOVNIKOV, Department of Physics, Boston University, DAVID WEISS, Physics Department, The Pennsylvania State University, University Park, ANA REY, JILA & Department of Physics, University of Colorado, Boulder — We present a variational mean field model used to characterize our recent experiments on the expansion dynamics of an ultra cold gas of ^{87}Rb atoms initially trapped in a two dimensional optical lattice. The expansion is driven by suddenly turning off the harmonic confinement potentials in all directions. *In situ* measurements of the density profile vs time were performed for different lattice depths. The observed dynamics are characterized by an initial suppression of the transverse dynamics, followed by a ballistic expansion across the lattice after the initial interaction energy is converted into kinetic energy along the free expanding axial direction. The slow initial expansion is predicted to be a manifestation of macroscopic self-trapping. We present comparisons between our variational model and the measured profiles.

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