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Experiments in a one-dimensional incommensurate lattice E.E. EDWARDS, M. BEELER, JENNIFER ROBINSON, TAO HONG, S.L. ROLSTON, JQI and Department of Physics, U. of Maryland — We investigate the effects of loading a ^{87}Rb Bose-Einstein condensate into a one-dimensional optical potential comprised of a shallow primary lattice with an additional weak, perturbing lattice of incommensurate period. The ratio of the primary to secondary lattice period is approximately 0.8. This scheme has previously been shown to mimic a weakly disordered potential. Matter-wave interference patterns from BECs released from the combined lattices show momentum peak separations corresponding to both the spatial periods of the individual lattices as well as the difference frequency. The presence of the beat frequency peaks is dependent on the external trapping potential and lattice strengths. The appearance of these peaks must be due to non-linear interactions, which create coupling between the two lattices. This behavior is surprising considering the shallow depth (≤ 0.2 E_R) of the perturbing lattice.

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