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**Coherence in Modulated Lattices and Strong Gradients** WILLIAM BURTON, COLIN KENNEDY, WOO CHANG CHUNG, WOLFGANG KETTERLE, Massachusetts Institute of Technology — Modulated lattices and strong energy gradients are promising tools in the field of quantum simulation with cold atoms, but they come with heating problems in the form of micromotion and dynamic instabilities. We experimentally study the loss of coherence of a Bose-Einstein Condensate in both one- and two-dimensional lattices under a strong energy gradient, observing the decay of Bloch Oscillations. In addition, we show that coherence is restored when resonant tunneling is allowed via amplitude modulation of the lattices and study its dynamics. This restoration and the subsequent coherence lifetime depend strongly on interaction strength and the turn-on procedure. Finally, we study the effect of an additional spin component on Bloch Oscillations and our simulated Hamiltonian.

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