

## Phase-controlled transport in periodically-driven optical lattices

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### ABSTRACT:

Bose-Einstein condensates held in optical lattice potentials provide an almost ideal arena for the study of coherent quantum phenomena. This allows an unusual means of control to be obtained by directly harnessing quantum interference effects. In this talk I will show how periodically-driving the condensate by “shaking” the lattice can produce a phenomenon termed “coherent destruction of tunneling”, in which the value of the intersite tunneling becomes renormalised. I will first show how this can be used to induce directed motion, and to precisely split and recombine particle wavepackets. I will then go on to consider the response of interacting systems, and show that this form of control is remarkably stable against the growth of unwanted perturbations, pointing to the attractive possibility of using these systems for quantum information tasks.