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Many-body Landau-Zener Transition in Cold Atom Double Well Optical Lattices[1] YINYIN QIAN, MING GONG, CHUANWEI ZHANG, The University of Texas at Dallas — Ultra-cold atoms in optical lattices provide an ideal platform for exploring many-body physics of a large system arising from the coupling among a series of small identical systems whose few-body dynamics are exactly solvable. Using Landau-Zener (LZ) transition of bosonic atoms in double well optical lattices as an experimentally realizable model, we investigate such few to many body route by exploring the relation and difference between the small few-body (in one double well) and the large many-body (in double well lattice) non-equilibrium dynamics of cold atoms in optical lattices. We find the many-body coupling between double wells greatly enhances the LZ transition probability, while keeping the main features of the few-body dynamics. Various experimental signatures of the many-body LZ transition, including atom density, momentum distribution, and density-density correlation, are obtained.

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