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Effect of quantum fluctuations on classical motion near a separatrix in a weakly anharmonic lattice RAFAEL HIPOLITO, Georgia Tech, VADIM OGANESYAN, CUNY College of Staten Island — We investigate the role of quantum fluctuations in the relaxation of a nonequilibrium interacting system for which the phase space curve of the corresponding classical dynamics lies near a separatrix. Such a system may be realized, for example, in a weakly interacting bosonic system if we initially excite a normal mode which lies in the low quasimomentum sector for which the the system is nearly dispersionless but of nondecay type ($\omega''(q) \lesssim 0$). As an example of such a system, we consider the case of a weakly anharmonic lattice in one dimension, where our results have some relevance to the famous Fermi-Pasta-Ulam problem. In the regime considered, we show that the classical dynamics is effectively dominated by just two normal modes which can be mapped into a single particle problem whose phase space curve lies near a separatrix. We show that for the quantum system the initial number of quanta plays the role of effective $\hbar$. Quantum fluctuations have a dramatic effect on the classical trajectory, causing the system to relax into a steady state where both the time scales associated with the relaxation and the steady state itself are strongly dependent on effective $\hbar$.

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