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【574】 Dimerized states and dynamical instabilities in a blue-detuned cavity-BEC system

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We numerically study a weakly-interacting, harmonically-trapped boson gas coupled to a high-finesse optical cavity. The bosons self-organise into a lattice when the driving laser is strong enough. When the cavity is blue-detuned, we observe dimerization of lattice sites which leads to states with different atomic correlations. With an even stronger pumping laser, the system is driven into dynamical instabilities, where strange attractor and chaos are observed. Such instabilities are related to Neimark-Sack bifurcation. However, the strange attractor behaviours are extremely vulnerable in the presence of atomic fluctuations and a tight harmonic trap.

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