

Abstract Submitted
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Quantum and mean-field nonequilibrium dynamics of atom transistor MAXIM OLSHANII, University of Massachusetts Boston, ZHEDONG ZHANG, SUNY Stony Brook — We illustrate that the neutral and ultracold atoms in asymmetric three wells can simulate the behavior of the atomic transistor, analogous to the electronic transistor in semiconductor. Under the mean-field approximation, it is found that the occupation of atoms in the drain can be significantly amplified by manipulating the occupation in the gate, to realize the “on” and “off” modes of the atomic transistor. We analysis the criterion for switching on the transistor and find the corresponding resonant value of gate occupation, by acquiring the mobility becomes sufficient for the drain occupation to reach its thermal value. To quantify the reliability of our mean-field approach in the semi-classical regime, the comparison between the semi-classical and the full quantum calculations is carried out, which shows a good agreement.

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