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## TREATING MANY-BODY SYSTEMS OF IDENTICAL PARTICLES BY MEANS OF CLASSICAL MECHANICS

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Many-body physics of identical particles is commonly believed to be a sovereign territory of Quantum Mechanics. The aim of this talk is to show that it is actually not the case and one gets useful insights into a quantum many-body system by using the theory of non-linear dynamical systems. In the talk I focus on one of paradigm models of many-body physics - the Bose-Hubbard model which, in particular, describes interacting ultracold Bose atoms in an optical lattice. After preliminary, purely quantum analysis of the system we introduce a classical counterpart of the Bose-Hubbard model and its governing equations of motion. We analyze these equations for the problem of Bloch oscillations of cold atoms where a number of experimental results are available and compare these results with those obtained by using pure classical arguments.