

The current PhD thesis presents a collection of selected articles related to the theoretical and numerical study of low-energy collective dynamics of atomic nuclei. The articles were published or recently submitted to international physics journals and were authored or co-authored by the author of the thesis. The effects in collective dynamics have been studied within the framework of two common models—the interacting boson model (IBM) and to a lesser extent the geometric collective model (GCM). The “statistical aspects” in the title relate predominantly to the interplay of ordered and chaotic behavior observed in properties of quantum eigenstates as well as in the classical limits of the models. The main attention was devoted to correlations between the measures of regularity/chaos and the presence of exact and approximate dynamical symmetries. An important subject of the studies were also the relationships between the properties of the classical and quantum solutions of the models both in the integrable regime as well as in the mixed regime containing elements of regularity and chaos simultaneously.