

# UNIFIED SEMICLASSICAL APPROACH TO ISOSCALAR COLLECTIVE EXCITATIONS IN NUCLEI

V. I. Abrosimov

*Institute for Nuclear Research, Kyiv*

A semiclassical model based on the solution of the Vlasov kinetic equation for finite systems with a moving surface has been used to study the isoscalar collective modes in heavy spherical nuclei. Within this model, a unified description of both low-energy surface modes and higher-energy giant resonances has been achieved by introducing a coupling between surface vibrations and the motion of single nucleons. An analytical expression for the isoscalar multipole response function can be derived by using a separable approximation for the residual interaction between nucleons. The response function obtained in this way gives a good qualitative description of the isoscalar (monopole, quadrupole and octupole) response in heavy nuclei. Although shell effects are not explicitly included in the theory, our semiclassical response functions are very similar to the quantum ones. This happens because of the well known close relation between classical trajectories and shell structure.