**Quantum-quasiclassical approach for few-body problems in atomic and nuclear physics**

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We discusses the efficient quantum-quasiclassical method developed by V.S. Melezhik with co-authors [1-4], which has been successfully applied to calculate various few-body processes and has made it possible to resolve a number of topical problems in atomic [1,3-5], mesoatomic [2], and nuclear physics [6]. In this approach, a few-body quantum problem is reduced to the simultaneous integration of a system of coupled quantum and classical equations: the time-dependent Schrödinger equation, which describes the quantum dynamics of slow light paricles, and the classical Hamilton equations, describing the fast variables of heavy particles.

Recently [5], the approach was extended and adapted for quantitative description of pair collisions of light slow Li atoms with heavy Yb+ ions in the confined geometry of the hybrid atom-ion trap. On the basis of these calculations, a new method for sympathetic cooling of ions in a RF Paul trap was proposed: to use cold buffer atoms for this purpose in the region of atom-ion confinement-induced resonance [5].

This approach also made it possible to perform calculations of the breakup cross sections into the low-energy region (up to 10 MeV/nucleon), inaccessible so far to other methods, for the 11Be breakup on a heavy target [6].

The developed quantum-quasiclassical method opens new possibilities in the investigation of other hot few-body quantum systems.

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