



Семинар  
«МАЛОЧАСТИЧНЫЕ СИСТЕМЫ»  
вторник, 26 ноября 2013 г., 11:00  
аудитория II этажа

---

**DESCRIPTION OF ULTRACOLD ATOMS  
IN A ONE-DIMENSIONAL GEOMETRY OF  
A HARMONIC TRAP WITH A REALISTIC INTERACTION**

**I. S. Ishmukhamedov, D. S. Valiolda, S. A. Zhaugasheva**

*BLTP, JINR, Dubna  
Al-Farabi Kazakh National University, Almaty*

We compute the ground state energy of two atoms in a one-dimensional geometry of a harmonic optical trap. We obtain a dependence of the energy on a one-dimensional scattering length, which corresponds to various strengths of the interaction potential  $V_{int}(x) = V_0 \exp\{-2cx^2\}$ . The calculation is performed by numerical and analytical methods. For the analytical method we choose the oscillator representation method (OR), which has been successfully applied to computations of bound states of various few-body systems. The main results of this paper are: (1) the numerical investigation of the validity range of the previously used pseudopotential method; (2) the investigation of the validity range of the OR for the potential  $V(x) = V_{conf}(x) + V_{int}(x) = \frac{x^2}{2} + V_0 \exp\{-2cx^2\}$ .

**ANISOTROPIC QUANTUM SCATTERING IN PLANE**

**E. A. Koval, O. A. Koval, V. S. Melezhik**

*BLTP, JINR, Dubna*

We study quantum scattering in two spatial dimensions ( $2D$  scattering). Our computational scheme permits quantitative analysis of the scattering parameters for the strong anisotropy of the interaction potential. The method high efficiency is demonstrated for the scattering from the repulsive cylinder with elliptical base and for the dipole-dipole collisions in the plane. We reproduce the result obtained recently by Ticknor [Phys.Rev. A84, 032702 (2011)] for the  $2D$  scattering of polarized dipoles in the pair collisions, and investigate the  $2D$  collisions of unpolarized dipoles.