INTERNATIONAL WORKSHOP ON

FEW-BODY SYSTEMS

(FBS-Dubna-2012)

Bogoliubov Laboratory of Theoretical Physics
JOINT INSTITUTE FOR NUCLEAR RESEARCH
Dubna, Russia, June 27 – 29, 2012

PROGRAM AND ABSTRACTS

Dubna
2012

INTERNATIONAL WORKSHOP ON

FEW-BODY SYSTEMS

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BLTP, JINR, Dubna, Russia, June 27 – 29, 2012

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of the German Ministry for Science and Technology (BMBF)

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Overview

The International Workshop on Few-Body Systems, FBS-Dubna 2012, will be held on June 27 – 29, 2012, at the Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna, Russia. The workshop program covers various topics in physics of few-body systems including scattering theory, Coulombic few-body problems, few-body resonances, Efimov effect, Borromean binding, etc.

Few-body systems theory is dedicated to various quantum systems that might be considered consisting of several (say two, three, or four) elementary constituents. Depending on a particular situation and the energy range under consideration, the role of such constituents may be played by quarks, mesons, individual nucleons, nuclei or even by atoms and molecules. Smallness of the number of constituents in a system allows one to develop mathematically rigorous, exact and faithful approaches to its treatment, that do not require further simplifying physical assumptions or approximations. Due to their universality, the approaches based on the theory of few-body systems pave the way to successful solving various problems in nuclear physics, in physics of atoms and molecules, in quantum chemistry etc.

The purpose of the workshop is to bring together experts and young researchers working on few-body problems of nuclear physics, astrophysics, and physics of atomic and molecular collisions, for presenting their new results, identifying hot topics, and reporting on progress in methods and approaches.

Program of the workshop includes the following topics:

- Scattering theory for quantum systems of several particles;
- Recent progress in theory of Coulombic few-body systems;
- Universal properties of few-body systems at ultra-low energies, Efimov and Thomas effects, Borromean binding, halo systems;
- Numerical approaches to solving few-body bound-state, resonance and scattering problems.

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Sessions of the workshop will take place at the **Conference Hall** of the Bogoliubov Laboratory of Theoretical Physics. The workshop schedule is as follows.

Workshop Schedule[1]

	27.06 We	28.06 Th		29.06 Fr
9.00-9.50	Registration			
09.50	Opening			
Chair	*Belyaev*	*Blokhintsev*		*Kartavtsev*
10.00	Pen'kov	Rubtsova		Efros
10.30	Melezhik	Kukulin		Fedotov
11.00	Bidasyuk	Efremov		Lekala
11.30 *11.50*	*Coffee break*	*Coffee break*		*Coffee break*
Chair	*Yakovlev*	*Sandhas*		*Popov*
11.50	Kartavtsev	Kolganova		Blokhintsev
12.20	Motovilov	Vinitsky		Orlov
12.50	Gusev	Kouzakov		Pupyshev
13.20 *15.00*	*Lunch*	*Lunch*		*Lunch*
Chair	*Motovilov*	*Pen'kov*		*Orlov*
15.00	Yakovlev	Sandhas		Solov'ev
15.30	Levin	Shlyk		Pons
16.00	Popov	Shevchenko		Grozdanov
16.30	Mikhailov	Revai		Belyaev
17.00 *17.20*	*Coffee break*	*Coffee break*		Closing
Chair	*Kolganova*	*Pupyshev*		
17.20	Grinyuk	17.20	Egorova	
17.50	Ershov	17.40	Zarubin	
18.20	Grigorenko	18.00	Cerkaski	
		18.20	Machavariani	
		18.40	Lyuboshitz	
19.00	*Welcome Party*			

[1] Status of June 21, 2012

are proposed. With the use of our models of $\alpha\alpha$-, nn-, pp-, $n\alpha$-, and $p\alpha$-interactions, we obtain an accurate description of the corresponding S-phase shifts of elastic scattering at low energies simultaneously with a precise description of the energies and radii of ^{10}Be and ^{10}C nuclei. General properties of the four-particle wave functions are studied, and two dominant configurations present in the nuclei are revealed. A detailed study of characteristic features of the structure functions of these nuclei is carried out. We analyze the density and charge distributions, form-factors, pair correlation functions [1]. We also obtain and explain the momentum distributions of α-particles, and of the extra nucleons.

The structure functions of the four-cluster nuclei ^{10}Be and ^{10}C are compared with those of the three-cluster halo nuclei ^{6}He and ^{6}Li.

The bound states of the ^{10}Be and ^{10}C nuclei within four-particle model are studied in the framework of a variational method with Gaussian bases providing enough precision in the four-body calculations.

1. B. E. Grinyuk and I. V. Simenog, Ukrain. J. Phys. **56**:7 (2001), 635.

Low-energy $H^+ + H_2$ reactive collisions: Role of permutation symmetry in mean-potential statistical model

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Complex-forming, reactive $H^+ + H_2$ system is studied in the interval of collision energies: $(0.001 - 0.5)$ eV. We use statistical theory based on a mean isotropic potential deduced from a full potential energy surface.The reaction probabilities incorporate the full permutation symmetry of the protons. We compare our results with other statistical models and full quantum mechanical approaches that take account of this symmetry either correctly, approximately or erroneously.

Resonant tunneling of the few bound particles through repulsive barriers

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A model of quantum tunneling of the few bound particles interacted by potential of oscillator type on the short-range repulsive barrier potentials is presented. We consider a