Few-Body Systems Group (Sector 11) at BLTP, JINR

2014 Annual Activity Report

Contents

1 Staff of the BLTP Sector 11 in 2014

1. Vladimir B. Belyaev, Prof., Dr. Sc., Principal Researcher
2. Ilyaz S. Ishmukhamedov, M.Sc., Junior Researcher
3. Sabit S. Kamalov, Dr., Senior Researcher
4. Elena A. Kolganova, Dr., Senior Researcher
5. Vladimir N. Kondratyev, Dr., Senior Researcher
6. Anastasia V. Malykh, Dr., Researcher
7. Vladimir S. Melezhik, Dr. Sc., Leading Researcher
8. Alexander K. Motovilov, Dr.Sc., Head of Sector
9. Yury V. Popov, Dr., Senior Researcher (part-time)
10. Vasily V. Pupyshev, Dr.Sc., Leading Researcher
11. Evgeni A. Solov'ev, Dr.Sc., Leading Researcher
12. Dinara S. Valiolda, M.Sc., Junior Researcher
13. Sergue I. Vinitsky, Dr.Sc., Leading Researcher

Olga P. Klimenko (Ph.D. Student, since November 2014)

Artem A. Korobitsin (Ph.D. Student, since November 2012)

Evgeny A. Koval (Ph.D. Student, since November 2013)

Oksana A. Koval (Ph.D. Student, since November 2013)

2 Publications

2.1 Journal publications

1. A.A. Bulychev , K.A. Kouzakov, and Yu.V. Popov, "Theoretical study on laser-assisted electron momentum spectroscopy of helium", *J. Phys: Conf. Series **488**, 112001 (2014) [1 page]*.

2. A.G. Galstyan, Yu.V. Popov, O. Chuluunbaatar, and B. Piraux, "Semi-analytical model of hydrogen ionization by strong laser pulse at low field frequencies", *J.Phys: Conf. Series **490**, 012035 (2014) [5 pages]*.

3. O. M. Gorbachenko, V. N. Kondratyev, Yu. S. Lutostansky, and V. I. Lyashuk, "LiB converter for neutron to neutrino source", *Bull. Russ. Acad. Sciences. Phys. **78**, 616–620 (2014)*.

4. D. D. Grachev, L. A. Sevastyanov, K. P. Lovetskiy, A.A. Gusev, S.I. Vinitsky, and V.L. Derbov, "Nonlinear spin waves in graphene structures", *SPIN (World Scientific Publishing Co), **4**, 1450005-1–14, (2014)*.

5. T. P. Grozdanov and E. A. Solov'ev, "Dynamical adiabatic theory of atomic collisions: The structure of hidden, avoided, and L_3 crossings", *Phys.Rev.* A **90**, 032706 (2014) [10 pages].

6. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, A.G. Abrashkevich, and V.L. Derbov, "Numerical solution of elliptic boundary-value problems for Schrodinger-type equations using the Kantorovich method," *Mathematical Modelling and Geometry **2**, 54–80 (2014).*

7. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, and A.G. Abrashkevich, "Algorithm for computing a wave packet evolution of the time-dependent Schrodinger equation," *Mathematical Modelling and Geometry **2**, 33–53 (2014).*

8. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, and A.G. Abrashkevich, "KANTBP 3.0: New version of a program for computing energy levels, reflection and transmission matrices, and corresponding wave functions in the coupled-channel adiabatic approach," *Comput. Phys. Commun. **185**, 3341-3343 (2014)*.

9. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, and A.G. Abrashkevich, "KANTBP 3.0: New version of a program for computing energy levels, reflection and transmission matrices, and corresponding wave functions in the coupled-channel adiabatic approach", *Bulletin of PFUR, ser. "Math. Comp. Sci. Phys." **2**, 342–349 (2014).*

10. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, and A.G. Abrashkevich, "Description of a program for computing eigenvalues and eigenfunctions and their first derivatives with respect to the parameter of the coupled parametric self-adjoined elliptic differential equations", *Bulletin of PFUR, ser. "Math. Comp. Sci. Phys." **2**, 336–341 (2014).*

11. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, V.L. Derbov, A. Góźdź, L.L. Hai, and V.A. Rostovtsev, "Symbolic-numerical solution of boundary-value problems with self-adjoint second-order differential equation using the finite element method with interpolation Hermite polynomials," *Lecture Notes in Computer Science **8660**, 138-154 (2014).*

12. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, and A.G. Abrashkevich, “POTHEA: A program for computing eigenvalues and eigenfunctions and their first derivatives with respect to the parameter of the parametric self-adjoined 2D elliptic partial differential equation,” *Comput. Phys. Commun.* ***185****, 2636-2654 (2014)*.

13. A.A. Gusev, S.I. Vinitsky, O. Chuluunbaatar, A. Góźdź, and V.L. Derbov, “Resonance tunnelling of clusters through repulsive barriers”, *Physica Scripta* ***89****, 054011-1-7 (2014)*.

14. A.A. Gusev, S.I. Vinitsky, O. Chuluunbaatar, L.L. Hai, V.L. Derbov, A. Góźdź, and P.M. Krassovitskiy, ”Resonant tunneling of a few-body cluster through repulsive barriers”, *Physics of Atomic Nuclei 77, 389-413 (2014)*

15. B.F.Irgaziev and V.B.Belyaev, “Three-body treatment of the *pep* reaction in the Sun”, *Few-Body Syst.* ***8****, 783–786 (2014)*.

16. B.F.Irgaziev, V.B.Belyaev, and J.-U. Nabi, “The estimation of the neutrino flux produced by *pep* reactions in the Sun”, *Physica Scripta* ***89****, 084010 (2014) [6 pages]*.

17. I. S. Ishmukhamedov, D. S. Valiolda, S. A. Zhaugasheva “Description of ultracold atoms in a one-dimensional geometry of a harmonic trap with a realistic interaction”, *Phys. Elem. Part. Nucl. Lett.* ***11****(3), 238–244 (2014)*.

18. O. I. Kartavtsev and A. V. Malykh , “Recent advances in description of few two-component fermions”, *Yad. Fiz. 77, 458–465 (2014)*.

19. E.A.Kolganova, “Ultracold scattering and universal correlations”, *Few-Body Syst.* ***55****, 957–960 (2014)*.

20. V. N. Kondratyev, “Explosive nucleosynthesis at strong magnetic field”, *Eur. Phys. J. A* ***50****, 7 (2014) [6 pages]*.

21. V. N. Kondratyev, Yu. V. Korovina “Explosive nucleosynthesis at strong stellar magnetization", *Odessa Astronomical Publications* ***27****, 327 (2014) [2 pages]*.

22. V. N. Kondratyev and Yu. V. Korovina, “SGR bursts as magnetar crust magnetoemission at junior age”, *Bull. Univ. Kiev. Astronomy* ***no. 4****, 32–34 (2014)*.

23. A. A. Korobitsin and N. N. Voitishin, “Expediency of using the ’peaceful’ atom”, *Nauchno-tekhnicheskoe razvitie i prikladnaya etika* ***72****, 249–253 (2014)* (in Russian).

24. E. A. Koval, O. A. Koval, and V. S. Melezhik, “Anisotropic quantum scattering in two dimensions”, *Phys. Rev. A* ***89****, 052710 (2014)* [10 pages].

25. O. A. Koval and E. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, *Bulletin of PFUR. Series Mathematics. Information Sciences. Physics.* ***2*** *369—374 (2014)*.

26. J. Lecointre, K. A. Kouzakov, D. S. Belic, P. Defrance, Yu. V. Popov, and V. P. Shevelko, “Electron impact multiple ionization of C^+, N^+ and O^+ ions”, *J. Phys.: Conf. Series* ***488****, 062002 (2014) [1 page]*.

27. V. S. Melezhik, “Non-direct product discrete-variable representation in low-dimensional few-body problems”, *Physics of Atomic Nuclei 77, 446–452 (2014)*.

28. V. S. Melezhik, “Resonances in ultracold collisions confined by atomic traps”, *J. Phys.: Conf. Series **497**, 012027-1–9 (2014)*.

29. A. K. Motovilov, “On applying the subspace perturbation theory to few-body Hamiltonians”, *Few-Body Syst. **55**, 813–816 (2014)*.

30. A. K. Motovilov, “Eigenvectors of multichannel scattering matrix at resonance energy values”, *Phys. Atom. Nucl. 77:4, 453–462 (2014)*.

31. Yu.V. Popov, V.L. Shablov, K.A. Kouzakov, and A.G. Galstyan, “Comment on ’Dynamics of transfer ionization in fast ion-atom collisions”’, *Phys.Rev. A **89**, 036701 (2014) [5 pages]*.

32. V. V. Pupyshev, “ Scattering of a slow quantum particle on a central short-range potential”, *Physics of Atomic Nuclei 77, 661–663 (2014).*

33. V. V. Pupyshev, “ Scattering of a slow quantum particle on an axially-symmetric short-range potential”, *Physics of Atomic Nuclei 77, 664–675 (2014).*

34. V. V. Pupyshev, “ The length and effective radius of a two-dimensional scattering of a quantum particle by a centrally symmetric short-range potential”, *Theoretical and Mathematical Physics **180**, 1051–1072 (2014).*

35. V. V. Pupyshev, “Energies of weakly-bound and near-threshold resonance states of a quantum particle in the two-dimensional plane”, *Theoretical and Mathematical Physics, **179**, 472–489, (2014).*

36. M. S. Schoeffler, O. Chuluunbaatar, Yu. V. Popov, S. Houamer, J. Titze, T. Jahnke, L. Ph. H. Schmidt, O. Jagutzki, A. G. Galstyan, and A. A. Gusev, “2D momentum distribution of electron in transfer ionization of helium atom by fast proton”, *J.Phys: Conf. Series **488**, 082002 (2014) [1 page]*.

37. M. S. Schoeffler, O. Chuluunbaatar, S. Houamer, J. Titze, T. Jahnke, L. Ph. H. Schmidt, A. G. Galstyan, and Yu. V. Popov, “Transfer excitation reactions in fast proton-helium collisions”, *J.Phys: Conf. Series **488**, 082003 (2014) [1 page]*.

38. M. S. Schoeffler, H.-K. Kim, O. Chuluunbaatar, S. Houamer, A.G. Galstyan, J. N. Titze, T. Jahnke, L. Ph. H. Schmidt, H. Schmidt-Boecking, R. Doerner, Yu. V. Popov, and A. A. Bulychev “Transfer excitation reactions in fast proton-helium collisions”, *Phys. Rev. A **89**, 032707 (2014) [9 pages]*.

39. E. A. Solov’ev, “Physical and metaphysical aspects of time and consciousness”, *Cosmology **18**, 201–211 (2014).*

40. S.I. Vinitsky, A.A. Gusev, O. Chuluunbaatar, L.L. Hai, V.L. Derbov, P.M. Krassovitskiy, and A. Góźdź, “Symbolic numerical algorithm for solving quantum tunneling problem of a diatomic molecule through repulsive barriers,”*Lecture Notes in Computer Science **8660**, 472-490 (2014).*

2.2 Articles in paper collections/conference proceedings

1. V.N.Kondratyev, V.V.Krylov, O.A.Bezshyyko, L.O.Golinka-Bezshyyko, "Self-organized criticality in superferromagnets", *Proc. 7th Int. Conf. on Physics of Liquid Matter: Modern Problems (Kyiv, Ukraine, May 22 - 27, 2014), p. 7–15.*

2. O. A. Koval, E. A. Koval, "Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps", *Proceedings of the XVIII International Scientific Conference of Young Scientists and Specialists(24–26 February 2014, Dubna), BLTP, JINR, Dubna, pp. 67–71, (2014).*

3. S. Vinitsky, A. Gusev, O. Chuluunbaatar, L.L. Hai, V. Derbov, and P.M. Krassovitskiy, "Models of quantum tunneling of a diatomic molecule affected by laser pulses through repulsive barriers", *Proceedings of SPIE **9031**, 90311D (2014).*

4. S. Vinitsky, A. Gusev, O. Chuluunbaatar, V. Derbov, A. Klombotskaya, and A. Góźdź, "Models of two-electron composite quantum systems", *Proceedings of SPIE **9031**, 90311E (2014).*

2.3 Articles accepted for publication

1. E. A. Koval, "Anisotropic quantum scattering in plane", *Proceedings of the XII Kurchatov Youth Scientific School* (accepted for publication).

2. O. A. Koval, E. A. Koval, "Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps", *Proceedings of the XII Kurchatov Youth Scientific School* (accepted for publication).

3. O. A. Koval, E. A. Koval, and V. S. Melezhik, "Numerical algorithm of quantum scattering problem in plane", *Pepan Letters* (accepted for publication).

4. V. V. Pupyshev, "Effective-range approximation in the problem of two-dimensional scattering by a central short-range potential", *Theoretical and Mathematical Physics* (accepted for publication).

2.4 Preprints and data bases

1. S. Albeverio and A. K. Motovilov, "Bounds on variation of the spectrum and spectral subspaces of a few-body Hamiltonian", arXiv:1410.3231.

2. V.B.Belyaev and A.Babič, "Solving the Schrödinger equation with power anharmonicity", arXiv:1409.5086.

2.5 Conference presentations

1. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, V.L. Derbov "Barrier metastable states of system of identical particles coupled by harmonic oscillator potential" International Conference on Integrable Systems and Quantum symmetries (ISQS), (June 23 - 29, 2014, Prague, Czech Republic), oral presentation.

2. A. Gusev, O. Chuluunbaatar, S. Vinitsky, V. Derbov, A. Góźdź, V. A. Rostovtsev and L.L. Hai "Symbolic-numerical solution of boundary-value problems with self-adjoint second-order differential equation using the finite element method with interpolation Hermite polynomials" The 16th International Workshop on Computer Algebra in Scientific Computing (September 8 - 12, 2014, Warsaw, Poland), oral presentation.

3. A.A. Gusev, O. Chuluunbaatar, S.I. Vinitsky, L. Le Hai, V.A. Rostovtsev, V.L. Derbov "Symbolic-numerical algorithm of solution of boundary-value problems using the finite element method with interpolation Hermite polynomials", 17-th Workshop on Computer Algebra (21-22 May, Dubna, Russia), oral presentation.

4. S. Houamer, S. Nehaoua, C. Dal Cappello, Yu. Popov, F. Menas, "A turn-up investigation in Electron Momentum Spectroscopy", International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces (MPS2014) (July 16-18, 2014, Universite de Lorraine, Metz, France), poster

5. I. S. Ishmukhamedov "A finite-range interaction of ultracold atoms in an external optical potential", I International Farabi Readings (2 – 12 April 2014, Al-Farabi Kazakh National University, Almaty, Kazakhstan), section talk.

6. I. S. Ishmukhamedov "A finite-range interaction of ultracold atoms in an external optical potential", International Conference "Modern problems of condensed matter physics, nanotechnology and nanomaterials", Sarsembinov Readings (15 – 16 May 2014, Al-Farabi Kazakh National University, Almaty, Kazakhstan), poster

7. S.S.Kamalov, "DMT and MAID models", Workshop "Excited Baryons: Design and analysis of complete experiments for meson photoproduction" (ECT*, Trento, Italy), 06.06.2014–04.07.2014, section talk.

8. O. I. Kartavtsev, A.V. Malykh, "Complete universal description of the three-body spectrum of two-component fermions ", Universality in few-body systems: Theoretical challenges and new directions (March 10 – May 16 2014, Seattle, USA), invited talk.

9. E. A. Kolganova, "The rare gas clasters and universal correlations", The 7th International and Interdisciplinary Workshop on the Dynamics of Critically Stable Quantum Few-Body Systems (Critical Stability 2014) (12 – 17 October 2014, Santos, Brazil), invited talk.

10. V.N.Kondratyev, "Burning of atomic nuclei. I. Hydrostatic burning", XII-th Winter School on Theoretical Physics "Few-body systems: Theory and Applications" (February 3–8, 2014, Dubna, Russia).

11. V.N.Kondratyev, "Self-organized criticality in superferromagnets", International School "Advanced Methods of Modern Theoretical Physics: Integrable and Stochastic Systems" (August 3–8, 2014, Dubna, Russia)

12. V.N.Kondratyev and Y.V.Korovina, "Soft Γ-ray bursts as magnetoemission of magnetars at junior age", International Conference "Astronomy and Space Physics" (Kyiv, Ukraine, May 27–30, 2014).

13. V.N. Kondratyev, I.V. Kres, I.M. Kadenko, S. Cherubini, and C. Spitaleri, “Coulomb and nuclear interactions at sub-barrier reactions”, International Conference “Astronomy and Space Physics” (Kyiv, Ukraine, May 27–30, 2014).

14. V.N.Kondratyev, Y.V.Korovina, and P.Blanchard, “Superferromagnetic sensors”, International Conference “Physics of Magnetism’14” (June 23–27, 2014, Poznan, Poland).

15. V.N.Kondratyev and Y.V.Korovina, “Soft Γ-ray bursts as magnetoemission of magnetars”, International Conference “Physics of Neutron Stars – 2014” (St. Petersburg, Russia, July 28 – August 1, 2014).

16. V.N. Kondratyev, “Exploring the Universe by cosmic observatories”, International Conference “The Education and Science and their Role in Social and Industrial Progress of Society” (Kyiv, Ukraine, June 12–15, 2014).

17. V.N.Kondratyev, I.V.Kres, I.M.Kadenko, S.Cherubini, and C.Spitaleri, “Astrophysical *S*-factor for nuclear burning studies”, International Conference “The Education and Science and their Role in Social and Industrial Progress of Society” (Kyiv, Ukraine, June 12–15, 2014).

18. V. N. Kondratyev and Y. V. Korovina, “Explosive nucleosynthesis at strong stellar magnetization”, 14-th Odessa International Astronomical Gamow Conference-School “Astronomy and Beyond: Astrophysics, Cosmology and Gravitation, Cosmomicrophysics, Radio-Astronomy and Astrobiology” (17–24 August, 2014, Odessa, Ukraine).

19. E. A. Kolganova, “The basic methods of experimental data processing”, Advanced students physics training course (7 – 31 July, 2014, Prague, Czech Republic), lectures.

20. A. A. Korobitsin and E. A. Kolganova, “Theoretical study of the rare gases dimers”, The school–conference of young scientists and specialists of JINR (2 – 7 June 2014, Alushta, Russia), oral presentation

21. A. A. Korobitsin and E. A. Kolganova, “The rare gas clusters”, The 46th Conference of the European Group on Atomic Systems (1 – 4 July 2014, Lille, France), poster presentation.

22. A. A. Korobitsin and E. A. Kolganova, “The rare gas clusters”, 40th meeting of the JINR PAC for Nuclear Physics (27 June 2014, Dubna, Russia), poster.

23. E. A. Koval, O. A. Koval, V. S. Melezhik, “Anisotropic quantum scattering in plane”, EGAS 46th conference of the European Group of Atomic Systems (1–4 July 2014, Universite Lille1, Lille, France), poster presentation.

24. E. A. Koval, O. A. Koval, “Anisotropic quantum scattering in plane”, XII Kurchatov Youth Scientific School (28–31 October 2014, Kurchatov Institute, Moscow), oral presentation.

25. E. A. Koval, O. A. Koval, “Anisotropic quantum scattering in plane”, International Conference-School for Young Scientists «Modern Problems of Applied Mathematics & Computer Science» (25–29 August 2014, Dubna, Russia), poster presentation.

26. E. A. Koval, O. A. Koval, “Anisotropic quantum scattering in plane”, XVIII International Scientific Conference of Young Scientists and Specialists dedicated to dedicated to the 105th anniversary of the birth of Nikolai N. Bogoliubov (24–28 February 2014, Dubna, Russia), oral presentation.

27. E. A. Koval, O. A. Koval, “Anisotropic quantum scattering in plane”, 3-d International Scientific School-Conference of Young Scientists and Specialists(2–8 June 2014, Alushta, Russia), oral presentation.

28. E. A. Koval, O. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, EGAS 46th conference of the European Group of Atomic Systems (1–4 July 2014, Universite Lille1, Lille, France), poster presentation.

29. E. A. Koval, O. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, XII Kurchatov Youth Scientific School (28–31 October 2014, Kurchatov Institute, Moscow), oral presentation.

30. E. A. Koval, O. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, International Conference-School for Young Scientists «Modern Problems of Applied Mathematics & Computer Science» (25–29 August 2014, Dubna, Russia), poster presentation.

31. E. A. Koval, O. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, XVIII International Scientific Conference of Young Scientists and Specialists dedicated to dedicated to the 105th anniversary of the birth of Nikolai N. Bogoliubov (24–28 February 2014, Dubna, Russia), oral presentation.

32. E. A. Koval, O. A. Koval, “Modeling of bound states of quantum systems in a two-dimensional geometry of atomic traps”, 3-d International Scientific School-Conference of Young Scientists and Specialists(2–8 June 2014, Alushta, Russia), oral presentation.

33. A.G. Galstyan, Yu.V. Popov, B. Piraux , and O. Chuluunbaatar, “Theoretical study of low frequency ionization of atomic hydrogen”, International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces (MPS2014) (July 16-18, 2014, Universite de Lorraine, Metz, France), poster.

34. V. S. Melezhik “Ultracold few-body systems in optical traps”, India-JINR Forum: Frontiers in Elementary Particle, Nuclear and Condensed Matter Physics, 16–20 June 2014, Dubna, Russiahttp://theor.jinr.ru/ if2014/talks.html, scientific report (oral)

35. V. S. Melezhik “Ultracold collisional processes in in quasi-1D and 2D geometry of atomic traps”, 23th Annual International Laser Physics Workshop (LPHYS’14) (14.07.2014—18.07.2014, Sofia, Bulgaria), oral presentation

36. V. S. Melezhik “Ultracold collisional processes in atomic traps”, 46th Conference of the European Group on Atomic Systems (EGAS46) (01.07.2014—04.07.2014, Lille, France), poster presentation.

37. V. S. Melezhik “Controllable narrowing of magnetic Feshbach resonances in atomic traps”, Workshop on Precision Physics and Fundamental Physical Constants. (FPC-2014), 1–5 December 2014, Dubna, Russia, oral presentation.

38. A.K.Motovilov, "Point interactions in the problem of three particles with internal structure", International Workshop Mathematical Challenges of Zero-Range Physics: Rigorous Results and Open Problems, (26–28 February 2014, Munich, Germany), invited talk.

39. A.K.Motovilov, "Bounds on variation of the spectrum and spectral subspaces of a few-body Hamiltonian", International Conference "Nuclear Theory in the Supercomputing Era -– 2014" (23–27 June 2014, Khabarovsk, Russia), invited talk.

40. A.K.Motovilov, "Bounds on variation of spectral subspaces", International Workshop on Operator Theory and its Applications (IWOTA 2014) (14–18 July 2014, Amsterdam, The Netherlands).

41. Yu.V. Popov, "Transfer processes in proton-helium collisions at high projectile energies", International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces (MPS2014) (July 16-18, 2014, Universite de Lorraine, Metz, France), plenary talk.

42. S. Vinitsky, A. Gusev, O. Chuluunbaatar, H. Sarkisyan, V. Derbov "Adiabatic description of spectral and optical characterisitics of axial-symmetric quantum dots", 2nd International Symposium on Optics and its Applications (1–5 September 2014, Yerevan and Ashtarak, Armenia), oral presentation.

43. S. Vinitsky, A. Gusev, O. Chuluunbaatar, L.L. Hai, V. Derbov, P. Krassovitskiy and A. Gozdz "Symbolic numerical algorithm for solving quantum tunneling problem of a diatomic molecule through repulsive barriers", The 16th International Workshop on Computer Algebra in Scientific Computing (September 8 - 12, 2014, Warsaw, Poland), oral presentation.

44. S. Vinitsky, A. Gusev, O. Chuluunbaatar, L.L. Hai, V. Derbov, A. Klombotskaya, A. Gozdz "Adiabatic description of two-electron quantum systems with confinement potentials," Laser Physics and Photonics XVI, Saratov Fall Meeting (September 23 - 26, 2014, Saratov, Russia), oral presentation.

2.6 Seminar talks

1. T. P. Grozdanov and E. A. Solov'ev, "Dynamical adiabatic theory of atomic collisions: The structure of hidden, avoided, and L_3 crossings" (27.10.2014, Seminar on Nuclear Theory BLTP, JINR, Dubna).

2. I. S. Ishmukhamedov, "Anharmonic effects in a spectrum of a two-body atomic system in a one-dimensional optical trap" (9 December 2014, Seminar on Few-Body Systems, Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna).

3. A. K. Motovilov, "Bounds on perturbation of spectra and spectral subspaces" (20 November 2014, Seminar on Geometry and Mathematical Physics, SISSA, Trieste, Italy).

4. Yu. V. Popov, "Transfer processes in proton-helium collisions at high projectile energies" (14 October 2014, Seminar on Few-Body Systems, Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna).

3 Visits

3.1 Conferences, schools

1. I. S. Ishmukhamedov, "I International Farabi Readings" (Al-Farabi Kazakh National University, Almaty, Kazakhstan), 02.04.2014–12.04.2014.

2. I. S. Ishmukhamedov, International Conference "Modern problems of condensed matter physics, nanotechnology and nanomaterials", Sarsembinov Readings (Al-Farabi Kazakh National University, Almaty, Kazakhstan), 15.05.2014–16.05.2014.

3. P. Jaluvkova, International School of Nuclear Physics, 36th Course — Nuclei in the Laboratory and in the Cosmos (Erice, Sicily, Italy), 16.09.2014–24.09.2014.

4. S. S. Kamalov, Workshop "Excited Baryons: Design and analysis of complete experiments for meson photoproduction" (ECT*, Trento, Italy), 06.06.2014–04.07.2014.

5. E. A. Kolganova, The 7th International and Interdisciplinary Workshop on the Dynamics of Critically Stable Quantum Few-Body Systems (Critical Stability 2014) (Santos, Brazil), 11.10.2014 – 18.10.2014.

6. E. A. Kolganova, Advanced Studies Institute "Symmetries and Spin" (SPIN-Praha-2014) (Prague, Czech Republic), 10.02.2014–16.02.2014.

7. E. A. Kolganova, Advanced students physics training course (Prague, Czech Republic), 17.07.2014–31.07.2014.

8. E. A. Koval, EGAS 46th conference of the European Group of Atomic SystemsUniversite Lille1, Lille, France), 1.07.2014–4.07.2014.

9. E. A. Koval, XII Kurchatov Youth Scientific SchoolKurchatov Institute, Moscow), 28.10.2014–31.10.2014.

10. E. A. Koval, 3-d International Scientific School-Conference of Young Scientists and SpecialistsAlushta, JINR), 02.06.2014–08.06.2014.

11. O. A. Koval, EGAS 46th conference of the European Group of Atomic SystemsUniversite Lille1, Lille, France), 1.07.2014–4.07.2014.

12. O. A. Koval, XII Kurchatov Youth Scientific SchoolKurchatov Institute, Moscow), 28.10.2014–31.10.2014.

13. V. S. Melezhik, 46th Conference of the European Group on Atomic Systems (EGAS46), 01-04.07.2014, Lille, France.

14. V. S. Melezhik, 23th Annual International Laser Physics Workshop (LPHYS'14), 14-08.07.2014, Sofia, Bulgaria.

15. A.K.Motovilov, International Workshop Mathematical Challenges of Zero-Range Physics: Rigorous Results and Open Problems (Munich, Germany), 26.02.2014–01.03.2014.

16. A.K.Motovilov, International Conference "Nuclear Theory in the Supercomputing Era -– 2014" (Khabarovsk, Russia), 21–28.06.2014.

17. A.K.Motovilov, International Workshop on Operator Theory and its Applications (IWOTA 2014) (Amsterdam, The Netherlands), 14–19.07.2014.

18. Yu.V. Popov, International Conference on Many Particle Spectroscopy of Atoms, Molecules, Clusters and Surfaces (MPS2014) (Universite de Lorraine, Metz, France), 16.07.2014–18 07.2014.

19. D. S. Valiolda, International scientific conference "Modern problems of physics and new technologies" (Almaty, Kazakhstan), 21.02.2014–22.02.2014.

20. D. S. Valiolda, International Scientific Conference of students and young scientists "Farabi world" (Almaty, Kazakhstan), 08.04.2014–11.04.2014.

21. S.I.Vinitsky, 2nd International Symposium on Optics and its Applications (Yerevan and Ashtarak, Armenia), 1–5 September 2014.

22. S.I.Vinitsky, The 16th International Workshop on Computer Algebra in Scientific Computing (Warsaw, Poland), 8–12 September 2014.

23. S.I.Vinitsky, Laser Physics and Photonics XVI, Saratov Fall Meeting (Saratov, Russia), 23–26 September 2014.

3.2 Collaboration visits

1. V. B. Belyaev, Physics Institute, Bonn University, Bonn, Germany, 03.05.2014-17.15.2014.

2. V. B. Belyaev, Institute for Nuclear Physics, Orsay, France, 06.12.2012-15.12.2014.

3. S. S. Kamalov, Universität Mainz, Mainz, Germany, 03.06.2014–06.07.2014.

4. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 02.12.2014–15.12.2014.

5. V. S. Melezhik, Center of Quantum Optics, Physics Department, University of Hamburg, Hamburg, Germany, 04.07.2014–13.07.2014.

6. V. S. Melezhik, Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan, 19.10.2014 - 01.11.2014.

7. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 19.07.2013–30.07.2014.

8. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 17.11.2014–27.11.2014.

9. Yu.V. Popov, Université Catolique de Louvain, Louvain-la-Neuve, Belgium, 01.04.2014–30.04.2014 and 10.11.2014–09.12.2014.
10. D.S.Valiolda, Al Farabi Kazakh National University, Department of physics and technology, (Almaty, Kazakhstan), 25.01.2014–21.03.2014.
11. S. I. Vinitsky, Maria Curie-Sklodowska University, Lublin, Poland 11.05.2014–17.05.2014.

4 Visitors

1. Andrzej Góźdź, Maria Curie-Sklodowska University, Lublin, Poland 17.08.2014–24.08.2014.
2. Tasko Grozdanov, Institute of Physics, Belgrade, Serbia, 23.03.2014–05.04.2014.
3. Tasko Grozdanov, Institute of Physics, Belgrade, Serbia, 26.10.2014–08.11.2014.
4. Alexandra Pędrak, Maria Curie-Sklodowska University, Lublin, Poland 17.08.2014–24.08.2014.
5. S.A.Rakityansky, University of Pretoria, South Africa, 26.03.2014–13.04.2014. and 12.07-11.08 , 2014.
6. S.A.Rakityansky, University of Pretoria, South Africa, 12.07.2014–11.08.2014.
7. S. Saeidian, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran, 15.06.2014 - 01.07.2014
8. N.V.Shevchenko, Institute of Nuclear Physics, Řež, Czech Republic, 02.02.2014–08.02.2014.

5 Teaching

1. V. B. Belyaev: Professor of the Dubna University, lecture course “Nuclear Astrophysics”.
2. V. B. Belyaev: Scientific adviser for summer practice of Andrey Babič, student of Comenius University in Bratislava, Slovakia.
3. V. B. Belyaev: Supervising of Ph.D.-student Paulina Javlukova (Silesian University in Opava, Chech Republic).
4. E. A. Kolganova: PhD adviser of A. Korobotsin, UNC JINR, Dubna.
5. E. A. Kolganova: PhD adviser of O. Klimenko, Univeristy Dubna.
6. E. A. Kolganova: Diploma adviser of O. Klimenko (master thesis), student of Dubna University, Dubna.
7. E. A. Kolganova: Diploma adviser of N. Korshunova (master thesis), student of Dubna University, Dubna.

8. E. A. Kolganova: Dozent of the Dubna University, lecture course “Mathematical modeling and numerical methods” (February–June and September–December, 2014).

9. E. A. Koval: seminars for first-year students “Physics of macrosystems”, Dubna University.

10. V. S. Melezhik: Professor of the Dubna University, lecture course “General physics”(all the academic year), lecture course “History and methodology of physics” (September–December 2014), lecture course “Modern problems of quantum physics” (September–December 2014).

11. V. S. Melezhik: Ph. D. Thesis adviser of E.A. Koval, Ph. D. student of Dubna University, Dubna.

12. V. S. Melezhik: Ph. D. Thesis adviser of O.A. Koval, Ph. D. student of JINR University Center, Dubna.

    V. S. Melezhik: Ph. D. Thesis adviser of I. Ishmukhamedov, Jr.Sc. of Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan and BLTP JINR, Dubna.

13. Yu.V. Popov, adviser of A.Galstyan, Ph. D. student of Moscow State University, Moscow.

14. A. K. Motovilov: Professor of the Dubna University, lectures and seminars on the course “Scattering theory for few-body systems” for 6th year students (September – December 2014).

15. A. K. Motovilov: Scientific adviser for autumn practice of S.T.Dlamini, student of Walter Sisulu University, South Africa.

16. A. K. Motovilov: Scientific adviser for autumn practice of P.Vaandrager, student of University of Pretoria, South Africa.

17. D. S. Valiolda: seminar course on nuclear physics at the Department of Physics and Technology, Al Farabi Kazakh National University (Almaty, Kazakhstan), 01.02.2014–20.03.2014.

18. S. I. Vinitsky: Diploma (master thesis) adviser of E. Klimov, student of Tver State University, Tver.

6 Organizational activity

1. V. B. Belyaev: Member of the D. Sc. Panel of BLTP, JINR.

2. V. B. Belyaev: Member of Organizing Committee, DIAS-TH XII Winter School “Few-Body Systems: Theory and Applications” (2 – 8 February 2014, Dubna, Russia).

3. E. A. Kolganova: Member of the BLTP NTS.

4. E. A. Kolganova: Scientific Secretary of the JINR NTS.

5. E. A. Kolganova: Scientific Secretary of the Council for conferring of bachelor and magister degrees at the Theoretical Physics Department, Dubna University.

6. E. A. Kolganova: Vice-chairperson The XIIth Winter School on Theoretical Physics (02 – 08 February 2014, BLTP JINR, Dubna).

7. E. A. Kolganova: Scientific Secretary, Advanced Studies Institute on Symmetries and Spin (10 – 16 February 2014, Prague, Czech Republic).

8. E. A. Kolganova: Scientific Secretary, The XVIth International Conference on Symmetry Methods in Physics (13 –18 October 2014, Dubna, Russia).

9. E. A. Kolganova: Support of the BLTP Website.

10. E. A. Kolganova, Co-Editor of the scientific edition:
R.Lednicky, A.V. Efremov, and E.Kolganova, Eds., "Spin Physics SPIN2012, Proceedings of the 20th International Symposium", *PEPAN **44**:6 (2014), 264 pp.*

11. V. N. Kondratyev: Member of Editorial Board of the International Journal of Astronomy and Astrophysics.

12. V. N. Kondratyev: Member of Editorial Board of the International Journal of Advanced Astronomy.

13. V. N. Kondratyev: Member of Editorial Board of "Research and Applications in Astronomy".

14. V. N. Kondratyev: Member of Alexander von Humboldt Club, Ukraine

15. A. A. Korobitsin: Member of Organizing Committee, DIAS-TH XII Winter School "Few-Body Systems: Theory and Applications" (2 – 8 February 2014, Dubna, Russia).

16. O. A. Koval: Chairperson of the Assosiation of Young Scirtists and Specialists of JINR

17. O. A. Koval: Member of the JINR NTS.

18. O. A. Koval: Member of the JINR Youth Commission.

19. O. A. Koval: Member of the Public Council of the JINR Directorate for Cooperation with the local self Dubna

20. O. A. Koval: Member of the commission on modernization of common social and engineering infrastructure of JINR

21. O. A. Koval: Member of the working group to develop a strategy for the development of information technology of JINR

22. O. A. Koval: Deputy Chairman of the Organizing Committee, 18th International Scientific Conference of Young Scientists and Specialists (OMUS 2014) (24–28 February 2014, JINR, Dubna, Russia)

23. O. A. Koval: Deputy Chairman of the Organizing Committee, III School-Conference of Young Scientists and Specialists Alushta (02–08 June 2014, JINR, Alushta)

24. O. A. Koval: Chairman of the Organizing Committee, XVIII Summer School of Young Scientists and Specialists of JINR (18–20 July 2014, Lipnya, JINR)

25. O. A. Koval: Scientific secretary of the Organizing Committee, Summer School Workshop Physics “105-th element” (22 July–02 August 2014, C. Volga, JINR)

26. O. A. Koval: Organizer, Festival of Science. Teleconference between JINR and SSU (27 November 2014, JINR)

27. O. A. Koval: Organizer, Youth Open Day Laboratory of Information Technologies for students of GUD (1 December 2014, JINR)

28. A. V. Malykh: Secretary of the BLTP Seminar on Few-Body Systems.

29. A. V. Malykh: Scientific Secretary of “Workshop on Precision Physics and Fundamental Physical Constants” (1 – 5 December 2014, JINR, Dubna, Russia).

30. V. S. Melezhik: Member of the D. Sc. Panel of LIT JINR.

31. V.S. Melezhik: Federal expert of Russian Ministry of Education and Science (ГБНУ НИИ РИНКЦЭ, Свидетельство №04-05381 от 27.02.2014).

32. V. S. Melezhik: Member of the BLTP Expert commission.

33. V.S. Melezhik: Editor of scientific edition “Adiabatic representation in the three-body Coulomb problem”, E4-2014-64 Dubna 2014.

34. A. K. Motovilov: Member of Editorial Board of the “Few-Body Systems” journal.

35. A. K. Motovilov: Member of the BLTP NTS.

36. A. K. Motovilov: Member of Organizing Committee, DIAS-TH XII Winter School “Few-Body Systems: Theory and Applications” (Dubna, Russia, February 2–8, 2014).

37. S. I. Vinitsky: Member of Program Committee, 2nd International Symposium on Optics and its Applications (1–5 September 2014, Yerevan and Ashtarak, Armenia)

38. S. I. Vinitsky: Member of Program Committee, Laser Physics and Photonics XVI, Saratov Fall Meeting (23 - 26 September, 2014 Saratov, Russia)

39. S. I. Vinitsky: Member of Organizing Committee, XVI International Conference on Symmetry Methods in Physics (SYMPHYS-XVI)(13-18 October, 2014, Dubna, Russia)

40. S. I. Vinitsky: Editor-in-Chief of the “Mathematical Modelling and Geometry” journal.

41. S. I. Vinitsky: Member of the PFUR Dissertation Board D 212.203.28.

7 Awards, prizes, etc.

1. E. A. Koval: Third prize for the theoretical work in *XVIII* scientific conference of young scientists and specialists of JINR.

2. O. A. Koval and E. A. Koval: diploma for the best oral presentation at a section of the XII Kurchatov Youth Scientific School-Conference (Moscow).

3. O. A. Koval: the best oral presentation of the section of the 3-d International Scientific School-Conference of Young Scientists and Specialists (Alushta).
4. V.S.Melezhik, “Outstanding APS Referee”, award of the American Physical Society (2014).
5. S.I. Vinitsky: Honorary Professor, Russian-Armenian (Slavonic) University.