

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

2007 Annual Activity Report

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Few-Body Systems Group (Sector 11) at [BLTP](#), [JINR](#) ([Dubna](#))

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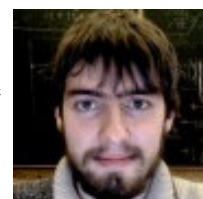
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2 Main results

Let A be a self-adjoint operator on a Hilbert space \mathfrak{H} . Assume that the spectrum of A consists of two disjoint components σ_0 and σ_1 such that the convex hull of the set σ_0 does not intersect the set σ_1 . Let V be a bounded self-adjoint operator on \mathfrak{H} off-diagonal with respect to the orthogonal decomposition $\mathfrak{H} = \mathfrak{H}_0 \oplus \mathfrak{H}_1$ where \mathfrak{H}_0 and \mathfrak{H}_1 are the spectral subspaces of A associated with the spectral sets σ_0 and σ_1 , respectively. It is known that if $\|V\| < \sqrt{2}d$ where $d = \text{dist}(\sigma_0, \sigma_1) > 0$ then the perturbation V does not close the gaps between σ_0 and σ_1 . Suppose that f is an eigenvector of the perturbed operator $A + V$ associated with its eigenvalue in the interval $(\min(\sigma_0) - d, \max(\sigma_0) + d)$. It is proven in [P1] that under the condition $\|V\| < \sqrt{2}d$ the (acute) angle θ between f and the orthogonal projection of f onto \mathfrak{H}_0 satisfies the bound $\tan \theta \leq \frac{\|V\|}{d}$ and this bound is sharp.

[P1] S. Albeverio, A. K. Motovilov, and A. V. Selin, “The *a priori* $\tan \theta$ theorem for eigenvectors”, *SIAM J. Matrix Anal. Appl.* **29**, 685–697 (2007).

Binding energies of three-body systems of the type $\phi + 2N$ are estimated in [P2]. Due to the strong attraction between ϕ -meson and nucleon, suggested in different approaches, bound states can appear in systems like $\phi + np$ (singlet and triplet), $\phi + nn$ and $\phi + pp$. This indicates the principal possibility of the formation of new nuclear clusters.

[P2] V. B. Belyaev, W. Sandhas and I. I. Shlyk, “New nuclear three-body clusters ϕNN ”, *arXiv: 0707.4615*.

The problem of collimation of jets observed in active galactic nuclei is still open. Paper [P3] suggests a model of dynamic collimation, produced by non-linear magneto-torsional oscillations in the cylindrical jet with elongated magnetic field. This approximate analytic model allows to estimate parameters for the regions with different behavior: 1) absence of any collimation at low amplitude oscillations; 2) quasi-stationary jet supported by magneto-torsional oscillations with moderate amplitude; 3) jet disruption into separate clumps at large amplitude of pulsations.

[P3] G. S. Bisnovaty-Kogan, “Dynamic confinement of jets by magneto-torsional oscillations”, *MNRAS* **376**, 457-464 (2007).

The unitary isobar model [MAID2007](#) has been developed [P4] to analyze the world data of pion photo- and electroproduction. The model contains both a common background and several resonance terms. The background is unitarized according to the K-matrix prescription, and the 13 four-star resonances with masses below 2 GeV are described by appropriately unitarized Breit-Wigner forms. The data have been analyzed by both single-energy and global fits, and the transverse and longitudinal helicity amplitudes have been extracted for the four-star resonances below 2 GeV. Because of its inherent simplicity, [MAID2007](#) is well adopted for predictions and analysis of the observables in pion photo- and electroproduction.

[P4] D. Drechsel, S. S. Kamalov and L. Tiator, “Unitary Isobar Model – MAID2007”, *Eur. Phys. J. A* **34**, 69–97 (2007).

The universal three-body dynamics in ultra-cold binary Fermi and Fermi-Bose mixtures is studied. A comprehensive universal description of the rotational-vibrational spectrum for two identical particles of mass m and the third particle of mass m_1 in the zero-range limit of the interaction between different particles is given for arbitrary values of the mass ratio m/m_1 and the total angular momentum L . For those L and m/m_1 , which correspond to the finite number of vibrational states, all the binding energies are described by the universal function depending on two scaled variables [P5]. The detailed study [P6] is performed for $L = 1$; in particular, it is shown that a two-hump structure in the mass-ratio dependencies of the elastic scattering cross section and the 3-body recombination rate are connected with arising of the bound states.

[P5] O. I. Kartavtsev and A. V. Malykh, “Universal description of the rotational-vibrational spectrum of three particles with zero-range interactions”, *Pis'ma ZhETF* **86**, 713–717 (2007).

[P6] O. I. Kartavtsev and A. V. Malykh, “Low-energy three-body dynamics in binary quantum gases”, *J. Phys. B* **40**, 1429–1441 (2007).

Results on binding energies and scattering observables in helium three-atomic systems have been reviewed in [P7]. These investigations were based on the hard-core version of the Faddeev differential equations. The binding energy of the $^3\text{He}^4\text{He}_2$ and $^4\text{He}_3$ trimers, scattering phase shifts, and the scattering length of a ^3He atoms off a ^4He dimer were calculated using different He-He interatomic potentials.

[P7] E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Ultracold scattering processes in threeatomic helium systems”, *Nucl. Phys. A* **790**, 752c-756c (2007).

A wave-packet propagation method is developed and applied to investigate the quantum dynamics of scattering processes of identical and distinguishable atoms in harmonic waveguides [P8]. The quantum dynamics of the confinement induced resonances (CIR) for ultracold collisions of identical particles, s -wave CIR for bosons and p -wave CIR for fermions, is explored in detail. Our multi-grid approach allows to fully take into account the coupling between the center-of-mass (CM) and the relative motion in case of distinguishable atoms. The latter includes in particular s and p partial wave mixing, caused by the confining trap which acts differently on the different atomic species. Specifically we explore in detail the recently discovered [P9] dual CIR which is based on a destructive interference mechanism leading to complete transmission in the waveguide although the corresponding scattering in free space exhibits strong s and p wave scattering.

[P8] V. S. Melezhik, J. I. Kim, and P. Schmelcher, “Wave-packet dynamical analysis of ultracold scattering in cylindrical waveguides”, *Phys. Rev. A* **29**, 053611 (2007) (15 pages).

[P9] J. I. Kim, V. S. Melezhik, and P. Schmelcher, “Suppression of quantum scattering in strongly confined systems”, *Phys. Rev. Lett.* **97**, 193203 (2006) (4 pages).

The six-dimensional Schrödinger and Faddeev equations for a three-body system with two-body central potentials of a more general type than the Coulomb ones are studied [P10]. The regular general and particular physical solutions of these equations are represented as infinite series in integer powers of the distance between one particle and the center of mass of two other particles and the sought functions of other three-particle coordinates. In the angular basis, formed by the spherical and bispherical harmonics or the symmetrized Wigner D -functions, the construction of these functions is reduced to solving simple algebraic recurrence equations. For the projections of the physical solutions to the Schrödinger and Faddeev equations onto angular basic functions the boundary conditions in the limit of the linear three-body configuration are derived.

[P10] V. V. Pupyshv, “Structure of regular solutions to the Schrödinger and Faddeev equations in the limit of the three-body linear configuration”, *Preprint P5-2007-37, JINR, Dubna 2007*.

3 Publications

3.1 Books

1. Eds. A. Sissakian, G. Kozlov, and E. Kolganova, “High Energy Physics ICHEP’06”, Proceedings of the 33rd International Conference, Vol. I and II, World Scientific, Singapore, 2007, 1264 pp.

3.2 Journal publications

1. S. Albeverio, A. K. Motovilov, and A.V. Selin, “The *a priori* $\tan \theta$ theorem for eigenvectors”, *SIAM J. Matrix Anal. Appl.* **29**, 685–697 (2007).
2. V. B. Belyaev, M. Tater, and E. Truhlik, “Influence of protons on the capture of electrons by ${}^7\text{Be}$ in the Sun”, *Phys. Rev. C* **75**, 034608 (2007) (4 pages).
3. G. S. Bisnovatyi-Kogan, “Dynamic confinement of jets by magneto-torsional oscillations”, *MNRAS* **376**, 457–464 (2007).
4. G. S. Bisnovatyi-Kogan and R. V. E. Lovelace, “Large-Scale B-Field in Stationary Accretion Disks”, *Astrophys. J. Lett.* **667**, L167–L169, (2007).
5. G. S. Bisnovatyi-Kogan and O. Y. Tsupko, “Evolution of angular momentum of primordial black holes in the hot universe”, *Astrofizika* **50**, 653–656, (2007).
6. G. Y. Chen, S. S. Kamalov, S. N. Yang, D. Drechsel, and L. Tiator, “Nucleon resonances in πN scattering up to energies $\sqrt{s} < 2.0$ GeV,” *Phys. Rev. C* **76**, 035206 (2007) (11 pages).
7. D. Drechsel, S. S. Kamalov, and L. Tiator, “Unitary Isobar Model – MAID2007”, *Eur. Phys. J. A* **34**, 69–97 (2007).
8. O. I. Kartavtsev and A. V. Malykh, “Low-energy three-body dynamics in binary quantum gases”, *J. Phys. B* **40**, 1429–1441 (2007).
9. O. I. Kartavtsev and A. V. Malykh, “Universal description of the rotational-vibrational spectrum of three particles with zero-range interactions”, *Pis'ma ZhETF* **86**, No. 9-10, 713–717 (2007).
10. J. I. Kim, V. S. Melezhik, and P. Schmelecher, “Quantum confined scattering beyond the s-wave approximation”, *Prog. Theor. Phys. Suppl.* **166**, 159–168 (2007).
11. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Ultracold scattering processes in three-atomic helium systems”, *Nucl. Phys. A* **790**, 752c–756c (2007).
12. V. Kostykin, K. A. Makarov, and A. K. Motovilov, “Perturbation of spectra and spectral subspaces”, *Trans. Amer. Math. Soc.* **359**, 77–89 (2007).
13. V. S. Melezhik, J. I. Kim, and P. Schmelcher, “Wave-packet dynamical analysis of ultracold scattering in cylindrical waveguides”, *Phys. Rev. A* **29**, 053611 (2007) (15 pages).
14. S. G. Moiseenko, G. S. Bisnovatyi-Kogan, “Magnetorotational supernovae. Magnetorotational instability. Jet formation”, *Astrophysics and Space Science* **311**, 191–195 (2007).

3.3 Articles in paper collections/conference proceedings

1. V. B. Belyaev, S. Levin, and E. Truhlik, “Adiabatic movement of three charged particles in continuum at astrophysical conditions”, In: *Models and Methods in Few- and Many-Body Systems. Proc. of the DST-UNISA-JINR Symposium* /Ed.: S. A. Sofianos (UNISA Press, Pretoria, 2007), pp. 39–50.
2. V. B. Belyaev, S. A. Rakityansky, and W. Sandhas, “Resonant states of the of the three-body systems Λn and $\Lambda\Lambda n$ ”, In: *Models and Methods in Few- and Many-Body Systems. Proc. of the DST-UNISA-JINR Symposium* /Ed.: S. A. Sofianos (UNISA Press, Pretoria, 2007), pp. 51–63; [arXiv: 0712.1911](https://arxiv.org/abs/0712.1911).
3. G. S. Bisnovatyi-Kogan, “Magnetorotational core-collapse supernovae: explosion and jet formation”, In: Proc. Vulcano Workshop 2006, *Conf. Proc. Ital. Phys. Soc.* **93**, 353–362 (2007).
4. G. S. Bisnovatyi-Kogan, “Recycled and binary pulsars: the precise laboratory for fundamental physics”, In: Proc. Vulcano Workshop 2006, *Conf. Proc. Ital. Phys. Soc.* **93**, 223–234 (2007).
5. S. I. Fedotov, O. I. Kartavtsev, and A. V. Malykh, “Effective three-body interactions in the α -cluster model for the ^{12}C nucleus”, In: *Models and Methods in Few- and Many-Body Systems. Proc. of the DST-UNISA-JINR Symposium* /Ed.: S. A. Sofianos (UNISA Press, Pretoria, 2007), pp. 64–73.
6. S. G. Moiseenko and G. S. Bisnovatyi-Kogan, “Magnetorotational supernovae”, In: Proc. Conf. ”Supernova 1987A: 20 Years After: Supernovae and Gamma-Ray Bursters”, *AIP Conference Proceedings* **937**, 275–279 (2007).
7. A. K. Motovilov, “Resonances of multichannel systems”, In: *Models and Methods in Few- and Many-Body Systems Proc. of the DST-UNISA-JINR Symposium* /Ed.: S. A. Sofianos (UNISA Press, Pretoria, 2007), pp. 136–150; [arXiv: quant-ph/0702178](https://arxiv.org/abs/quant-ph/0702178).

3.4 Books in press

1. Eds. J. E. Moerlins, M. K. Khankhasayev, S. F. Leitman, and E. J. Makhmudov, “Transboundary Water Resources: A Foundation for Regional Stability in Central Asia”, Springer, 2008, 313 pp.

3.5 Articles accepted for publication

1. S. Albeverio and A. K. Motovilov, “Operator integrals with respect to a spectral measure and solutions to some operator equations”, *Fundam. Appl. Math.* (accepted).
2. V. B. Belyaev, W. Sandhas, and I. I. Shlyk, “New nuclear three-body clusters ϕNN ”, *Few-Body Syst.* (accepted).
3. G. S. Bisnovatyi-Kogan and O. Y. Tsupko, ”Strong gravitational lensing on Schwarzschild black hole”, *Astrofizika* **51** (2008) (accepted).
4. D. Dimitrovski and E. A. Solov’ev, “Detachment from negative ions by an electric pulse: from symmetric to fully asymmetric momentum distribution”, *J. Phys. B* (accepted)

5. M. Kh. Khankhasayev and S. Leitman, “NATO/CCCMS Pilot Study Meeting on Transboundary Water Management Issues in the United States and Central Asia: Problem definition, regulation and management”, to be published in “Transboundary Water Resources: A Foundation for Regional Stability in Central Asia” /Eds. J. E. Moerlins, M. K. Khankhasayev, S. F. Leitman, and E. J. Makhmudov (Springer, 2008).
6. V. V. Pupyshev, “Structure of regular solutions to the Schrödinger and Faddeev equations in the limit of the three-body linear configuration”, *Theor. Math. Phys.* (accepted).
7. V. V. Pupyshev, “Structure of regular solutions to the Faddeev equations in the vicinity of the two-body collision point”, *Theor. Math. Phys.* (accepted).

3.6 Preprints and data bases

1. V. B. Belyaev, S. A. Rakityansky, and W. Sandhas, “Three-body resonances Λnn and $\Lambda \Lambda n$ ”, *arXiv: 0712.1911*.
2. V. B. Belyaev, W. Sandhas, and I. I. Shlyk, “New nuclear three-body clusters ϕNN ”, *arXiv: 0707.4615*.
3. G. S. Bisnovatyi-Kogan, “Cosmic gamma-ray bursts: observations and modeling”, *arXiv: astro-ph/0701461*.
4. G. S. Bisnovatyi-Kogan, “Jet confinement by magneto-torsional oscillations”, *arXiv: 0707.0122*.
5. G. S. Bisnovatyi-Kogan and R. V. E. Lovelace, “Large-scale B-field in stationary accretion disks”, *arXiv: 0708.2726*.
6. A. K. Motovilov, “Progress in methods to solve the Faddeev and Yakubovsky differential equations”, *arXiv: 0712.0620*.
7. V. V. Pupyshev, “Structure of regular solutions to the Schrödinger and Faddeev equations in the limit of the three-body linear configuration”, *Preprint P5-2007-37, JINR, Dubna, 2007*.
8. V. V. Pupyshev, “Structure of regular solutions to the Faddeev equations in the vicinity of the two-body collision point”, *Preprint P5-2007-41, JINR, Dubna, 2007*.
9. V. V. Pupyshev, “Structure of regular solutions to the Schrödinger and Faddeev equations in the vicinity of the triple collision point”, *Preprint P5-2007-79, JINR, Dubna, 2007*.

3.7 Conference presentations

1. V. B. Belyaev, S. B. Levin, and E. Truhlik, “Adiabatic movement of three charged particles in continuum at astrophysical conditions”, *DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”* (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa), oral presentation.
2. V. B. Belyaev, S. A. Rakityansky, and W. Sandhas, “Resonant states of the three-body systems Λnn and $\Lambda \Lambda n$ ”, *DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”* (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa), oral presentation.

3. V. B. Belyaev, S. A. Rakityansky, and W. Sandhas, “Three-body resonances Λnn and $\Lambda \Lambda n$ ”, the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy), poster.
4. V. B. Belyaev, W. Sandhas and I. I. Shlyk, “On the possibility of binding of phi-mesons with a few nucleons”, the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy), oral presentation.
5. G. S. Bisnovatyi-Kogan, “Centrifugal driving of differential rotation in convective star regions”, the [5th Potsdam Thinkshop “Meridional flow, differential rotation, solar and stellar activity”](#) (24 – 29 June, 2007, Potsdam, Germany), oral presentation.
6. G. S. Bisnovatyi-Kogan, “Jet collimation in active galactic nuclei”, [JENAM-2007 Meeting of the European Astronomical Society](#) (20 – 25 August 2007, Yerevan, Armenia), invited talk.
7. G. S. Bisnovatyi-Kogan, “Magneto-rotational mechanism of supernova explosion”, Conference “20 years of Supernova SN 1987A” (20 – 22 February 2007, INR RAN, Moscow), invited talk.
8. G. S. Bisnovatyi-Kogan, J. V. Artemova, I. V. Igumenshchev, and I. D. Novikov, “Black hole advective accretion disks”, [Frascati Workshop “Multifrequency Behavior of High Energy Cosmic Sources”](#) (28 May – 2 June 2007, Vulcano, Italy), oral presentation.
9. G. S. Bisnovatyi-Kogan and M. Merafina, “Dynamic and thermodynamic stability of relativistic stellar clusters”, International Conference “Dynamics of Galaxies” (6 – 10 August 2007, St. Petersburg, Russia), invited talk.
10. D. Dimitrovski, V.S.Melezhik and E. A. Solov’ev, “Momentum distribution of ejected electrons from atoms and ions by electric pulses”, the [XXV International Conference on Photonic, Electronic and Atomic Collisions](#) (25 – 31 July 2007, Freiburg, Germany), oral presentation.
11. G. S. Bisnovatyi-Kogan and S. G. Moiseenko, “Magnetorotational supernovae with jets”, [Frascati Workshop “Multifrequency Behavior of High Energy Cosmic Sources”](#) (28 May – 2 June 2007, Vulcano, Italy), invited talk.
12. S. I. Fedotov, O. I. Kartavtsev, and A. V. Malykh, ”Effective three-body interactions in the α -cluster model for the ^{12}C nucleus”, the [DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”](#) (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa), oral presentation.
13. S. I. Fedotov, O. I. Kartavtsev, and A. V. Malykh, ”Three alpha-cluster description of the ^{12}C nucleus”, [Helmholtz International Summer School “Nuclear theory and astrophysical application”](#) (7 – 17 August 2007, Dubna, Russia), oral presentation.
14. O. I. Kartavtsev and A. V. Malykh, “Universal low-energy dynamics of the binary three-body system”, the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy), oral presentation.
15. O. I. Kartavtsev and A. V. Malykh, “Bound states and scattering of three one-dimensional particles with a contact interaction”, the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy), poster.

16. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Ultracold helium trimers”, the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy), oral presentation.
17. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Ultracold scattering of He atoms”, [Advanced Studies Institute on Symmetries and Spin](#) (8 – 14 July, 2007, Prague, Czech Republic), oral presentation.
18. S. S. Kamalov, “Recent results from the MAID and Dubna-Mainz-Taipei PWA analysis”, [NSTAR 2007 Workshop on the Physics of Excited Nucleons](#) (5 – 8 September 2007, Bonn, Germany), plenary talk.
19. S. S. Kamalov, “Results from the MAID partial wave analysis”, the [24th Students’ Workshop on Electromagnetic Interactions](#) (9 – 14 September 2007, Bosen, Germany), seminar.
20. A. V. Malykh, “Hyperspherical harmonic methods”, [Winter Practice for South African Students at the Joint Institute for Nuclear Research](#) (9 - 19 December 2007, Dubna, Russia), seminar.
21. [A. V. Matveenکو](#), E. O. Alt, and H. Fukuda, “Low energy $\bar{p} + H$ physics in hyperspheroidal coordinates ”, the [International Conference “Muon Catalyzed Fusion and Related Topics”](#) (18 – 21 June 2007, Dubna, Russia), oral presentation.
22. V. S. Melezhik, “Wave-packet dynamics of ultracold atom-atom collisions in confinement”, [International Workshop “Quantum Dynamics of Ultracold Few-Body Systems”](#)(12 – 31 March 2007, Cuernavaca, Mexico), invited talk.
23. V. S. Melezhik, “ Few-body scattering problem as quantum wave-packets dynamics: ultracold atom-atom collisions in trap”, the [International Conference “Muon Catalyzed Fusion and Related Topics”](#) (18 – 21 June 2007, Dubna, Russia), oral presentation.
24. A. K. Motovilov, “Resonances of multichannel systems”, the [DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”](#) (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa), oral presentation.
25. [A. K. Motovilov](#) and A. V. Selin, “Optimal bounds on variation of spectral subspaces”, [International Conference “Modern Analysis and Applications”](#), dedicated to the centenary of Mark Krein (9 – 14 April 2007, Odessa, Ukraine), oral presentation.
26. A. K. Motovilov, “Sharp norm bounds on variation of spectral subspaces”, [International Conference “Differential Equations and Related Topics”](#), dedicated to I. G. Petrovskii (21–26 May 2007, Moscow State University, Moscow, Russia), oral presentation.
27. A. K. Motovilov, “Recent developments in methods to solve Faddeev and Yakubovsky differential equations”, the [20th European Conference on Few-Body Problems in Physics](#) (10–14 September 2007, Pisa, Italy), plenary talk.
28. E. A. Solov’ev, “Hidden crossing description of inelastic processes in μCF ”, the [International Conference “Muon Catalyzed Fusion and Related Topics”](#) (18 – 21 June 2007, Dubna, Russia), oral presentation.
29. E. A. Solov’ev, “Classical approach in quantum physics”, [Winter Practice for South African Students at the Joint Institute for Nuclear Research](#) (9 - 19 December 2007, Dubna, Russia), lectures.

4 Visits

4.1 Conferences, schools

1. V. B. Belyaev, the DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems” (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa).
2. V. B. Belyaev, the 20th European Conference on Few-Body Problems in Physics (10 – 14 September 2007, Pisa, Italy).
3. G. S. Bisnovatyi-Kogan, Frascati Workshop “Multifrequency Behavior of High Energy Cosmic Sources” (28 May – 2 June 2007, Vulcano, Italy).
4. G. S. Bisnovatyi-Kogan, the 5th Potsdam Thinkshop “Meridional flow, differential rotation, solar and stellar activity” (24 – 29 June, 2007, Potsdam, Germany).
5. G. S. Bisnovatyi-Kogan, Pushchino School of Modern Astrophysics (02 – 13 July 2007, Pushchino, Russia).
6. G. S. Bisnovatyi-Kogan, International Conference “Dynamics of Galaxies” (6 – 10 August 2007, St. Petersburg, Russia).
7. G. S. Bisnovatyi-Kogan, JENAM-2007 Meeting of the European Astronomical Society (20 – 25 August 2007, Yerevan, Armenia).
8. S. S. Kamalov, NSTAR 2007 Workshop on the Physics of Excited Nucleons (5 – 8 September 2007, Bonn, Germany).
9. S. S. Kamalov, 24th Students’ Workshop on Electromagnetic Interactions (9 – 14 September 2007, Bosen, Germany).
10. E. A. Kolganova, Advanced Studies Institute on Symmetries and Spin (8 – 14 July, 2007, Prague, Czech Republic).
11. E. A. Kolganova, the 20th European Conference on Few-Body Problems in Physics (10 – 14 September 2007, Pisa, Italy).
12. A. V. Malykh, the DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems” (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa).
13. A. V. Malykh, the 20th European Conference on Few-Body Problems in Physics (10 – 14 September 2007, Pisa, Italy).
14. V. S. Melezhik, the International Workshop “Quantum Dynamics of Ultracold Few-Body Systems”(12 – 31 March 2007, Cuernavaca, Mexico)
15. A. K. Motovilov, the DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems” (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa).
16. A. K. Motovilov, International Conference “Modern Analysis and Applications”, dedicated to the centenary of Mark Krein (9 – 14 April 2007, Odessa, Ukraine)
17. A. K. Motovilov, International Conference “Differential Equations and Related Topics”, dedicated to I. G. Petrovskii (21 – 26 May 2007, Moscow State University, Moscow, Russia)

18. A. K. Motovilov, the 20th European Conference on Few-Body Problems in Physics (10 – 14 September 2007, Pisa, Italy).

4.2 Collaboration visits

1. V. B. Belyaev, UNISA, Pretoria, South Africa, 20.01.2007–20.02.2007.
2. V. B. Belyaev, Institute for Nuclear Physics, Řež near Prague, Czech Republic, 06.05.2007–23.05.2007.
3. G. S. Bisnovatyi-Kogan, Physics Department, Tokyo University, Japan, 30.01.2007–15.02.2007.
4. G. S. Bisnovatyi-Kogan, South African Astronomical Observatory, Cape Town, South Africa, 01.04.2007–30.04.2007.
5. G. S. Bisnovatyi-Kogan, Physics Department, University La Sapienza, Rome, Italy, 10.10.2007–31.10.2007.
6. S. S. Kamalov, Institute of Nuclear Physics, Mainz University, Mainz, Germany, 19.03.2007–15.05.2007.
7. S. S. Kamalov, Institute of Nuclear Physics, Mainz University, Mainz, Germany, 01.09.2007–30.11.2007.
8. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 11.01.2007–2.04.2007.
9. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 16.04.2007–17.07.2007.
10. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 7.12.2007–14.07.2007.
11. A. V. Matveenkov, Institute of Physics, Mainz University, Mainz, Germany, 15.11.2007–30.11.2007.
12. V. S. Melezhik, Stefan Meyer Institute of Subatomic Physics of Austrian Academy of Sciences, Vienna, Austria, 10.01.2007–03.02.2007.
13. V. S. Melezhik, Institute of Physics, Heidelberg University, Heidelberg, Germany, 24.02.2007–03.03.2007.
14. V. S. Melezhik, Institute of Physics, Heidelberg University, Heidelberg, Germany, 02.07.2007–14.08.2007.
15. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 15.02.2007–31.03.2007.
16. A. K. Motovilov, Physics Institute, Bonn University, Bonn, Germany, 25.05.2007–24.07.2007.
17. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 21.10.2007–20.12.2007.

18. I. I. Shlyk, Physics Institute, Bonn University, Bonn, Germany, 20.08.2007–03.09.2007.
19. E. A. Solov'ev, Macedonian Academy of Sciences and Arts, Skopje, Macedonia, 01.01.2007–29.04.2007.

5 Visitors

1. L. Cattaneo, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 17.05.2007–24.05.2007.
2. S. B. Levin, V. A. Fock Institute for Physics, St. Petersburg State University, 23.04.2007–30.04.2007.
3. S. Saeidian, Institute of Physics, Heidelberg University, Heidelberg, Germany, 09.12.2007–15.12.2007.
4. W. Sandhas, Physics Institute, Bonn University, Bonn, Germany, 22.07.2007–3.08.2007.
5. S. Zoellner, Institute of Physical Chemistry, Heidelberg University, Heidelberg, Germany, 23.10.2007–28.10.2007.

6 Teaching

1. V. B. Belyaev: Ph. D. Thesis adviser of I. I. Shlyk, Ph. D. student at UNC, JINR, Dubna.
2. V. B. Belyaev: Diploma adviser of A. Naumkin, student of Moscow State University, Moscow.
3. G. S. Bisnovatyi-Kogan: Ph. D. Thesis Adviser of M. Yu. Tsupko, graduate student of Moscow Physics Engineering Institute, Moscow.
4. G. S. Bisnovatyi-Kogan: Professor of Moscow Physics Engineering Institute, Moscow, lecture course “Relativistic astrophysics and cosmology”.
5. M. Kh. Khankhasayev: Adjunct Professor at Physics Department of Florida State University, Spring and Summer Semesters 2007.
6. M. Kh. Khankhasayev: Visiting Professor at Florida A& M University, Fall Semester 2007.
7. E. A. Kolganova: Diploma adviser of V. Kolontsov, student of Dubna University, Dubna.
8. 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 2007).
9. V. S. Melezhik: Ph. D. Thesis co-adviser of Shahpoor Saeidian, Ph. D. student at Institute of Physics, Heidelberg University, Heidelberg, Germany.

10. V.S. Melezhik: two lectures at Graduate School of Fundamental Physics at the Department of Physics and Astronomy of the University of Heidelberg, Heidelberg, Germany: “Wave-packet propagation method for non-separable two-body scattering problem” and “Laser assisted ultracold atom-atom collisions” (February 2007).

7 Organizational activity

1. V. B. Belyaev: Member of the D. Sc. Panel of BLTP.
2. V. B. Belyaev: Member of the BLTP NTS.
3. V. B. Belyaev: Member of Organizing Committee of the [DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”](#) (6 – 9 February 2007, Skukuza, Kruger National Park, South Africa).
4. V. B. Belyaev: Member of International Advisory Committee of the [20th European Conference on Few-Body Problems in Physics](#) (10 – 14 September 2007, Pisa, Italy).
5. G. S. Bisnovaty-Kogan: Member of the D. Sc. Panel of IKI RAN.
6. G. S. Bisnovaty-Kogan: Member of the D. Sc. Panel of GAISH MGU.
7. G. S. Bisnovaty-Kogan: Member of the Scientific Council of IKI RAN.
8. G. S. Bisnovaty-Kogan: Member of the Editorial Board of the “Astrophysics” journal (Armenian Academy of Sciences).
9. G.S. Bisnovaty-Kogan: Member of the Editorial Board of the journal “Gravitation and Cosmology” (Russian Gravitational Society).
10. M. Kh. Khankhasayev: Director of the Program for Energy Studies, Florida State University, Tallahassee, Florida.
11. M. Kh. Khankhasayev: [Project Director](#) at the [Institute for International Cooperative Environmental Research \(ICEER\)](#) of the Florida State University, Tallahassee, Florida.
12. E. A. Kolganova: Member of Organizing Committee, [Advanced Studies Institute on Symmetries and Spin](#) (8 – 14 July, 2007, Prague, Czech Republic).
13. E. A. Kolganova: Member of Organizing Committee, [Helmholtz International Summer School on Modern Mathematical Physics](#) (22 – 30 July 2005, Dubna, Russia).
14. E. A. Kolganova: Member of Organizing Committee, the [XIIth International Workshop “High Energy Spin Physics”](#) (3 – 7 September 2007, Dubna, Russia).
15. E. A. Kolganova: Support of the [BLTP website](#).
16. A. V. Malykh: Secretary of the [Sector 11 seminar](#).
17. V. S. Melezhik: Member of the D. Sc. Panel of LIT JINR.
18. V. S. Melezhik: Member of the BLTP Expert commission.

19. V. S. Melezhik: Member of the Organizing Committee of the [International Conference “Muon Catalyzed Fusion and Related Topics”](#) (18 – 21 June 2007, Dubna, Russia).
20. A. K. Motovilov: Member of the BLTP NTS.
21. A. K. Motovilov: Member of the Ph.D. (C.Sc.) Panel of BLTP.
22. A. K. Motovilov: Member of Organizing Committee of the [DST-UNISA-JINR Symposium “Models and Methods in Few- and Many-Body Systems”](#) (6–9 February 2007, Skukuza, Kruger National Park, South Africa).
23. V. V. Pupyshev: Secretary of the BLTP Commission for Ph.D. (C.Sc) examinations.