

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

2005 Annual Activity Report

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1 Staff of the BLTP Sector 11 in 2005

1. [V.B. Belyaev](#), Prof., Dr. Sc., Principal Researcher
2. [G.S. Bisnovatyi-Kogan](#), Prof., Dr. Sc., Principal Researcher (part-time)
3. [S.S. Kamalov](#), Dr., Senior Researcher
4. [E.A. Kolganova](#), Dr., Senior Researcher
5. [M.Kh. Khankhasaev](#), Dr. Sc., Leading Researcher
6. [A.V. Malykh](#), M. Sc. Junior Researcher
7. [A.V. Matveenko](#), Dr. Sc., Leading Researcher
8. [V.S. Melezhik](#), Dr. Sc., Leading Researcher
9. [A.K. Motovilov](#), Dr., Head of the Group
10. [V.V. Pupyshev](#), Dr., Senior Researcher
11. [N.V. Shevchenko](#), Dr., Senior Researcher (till 08.2005)
12. [A.F. Os'kin](#) (M. Sc., Junior Researcher)

2 Publications

2.1 Journal publications

1. N. V. Ardeljan, G. S. Bisnovaty-Kogan, K. V. Kosmachevskii, and S. G. Moiseenko, “Magnetorotational supernovae”, *Mon. Not. R.A.S.* **359**, 333-344 (2005).
2. M. V. Barkov and G.S.Bisnovaty-Kogan, “Interaction of a cosmological gamma-ray burst with a dense molecular cloud and the formation of jets”, *Astron. Zh.* **82**, 29–40 (2005).
3. M. V. Barkov and G. S. Bisnovaty-Kogan, “The afterglow of a dense molecular cloud after the passage of a cosmological gamma-ray burst”, *Astron. Zh.* **82**, 685-697 (2005).
4. M. V. Barkov and G. S. Bisnovaty-Kogan, “Infrared afterglow of the gamma ray burst GRB041219 as the result of reradiation from dust in a circumstellar cloud”, *Astrophysics* **48**, 369-373 (2005).
5. M. V. Barkov, G. S. Bisnovaty-Kogan, A. I. Neishtadt, and V. A. Belinski, “On chaotic behavior of gravitating stellar shells”, *Chaos* **15**, 0131104, 8 pages (2005).
6. G. S. Bisnovaty-Kogan and O. Yu. Tsupko, “Approximate dynamics of dark matter ellipsoids”, *Mon. Not. R.A.S.*, **364**, 833–842 (2005).
7. S. I. Fedotov, O. I. Kartavtsev, and A. V. Malykh, “Effective three-body interactions in the α -cluster model for the ^{12}C nucleus”, *Eur. Phys. J. A* **26**, 201–207 (2005).
8. H. Fukuda, M. Katuya, E. O. Alt, and A. V. Matveenko, “Gaussian quadrature rule for arbitrary weight function and interval”, *Computer Physics Communications* **167**, 143–150, 2005.
9. V. Kostrykin, K. A. Makarov, and A. K. Motovilov, “On the existence of solutions to the operator Riccati equation and the $\tan \Theta$ theorem”, *Integral Equations and Operator Theory* **51**, 121–140 (2005).
10. I. Kryukov, N. Pogorelov, U. Anzer, G. Börner, and G. Bisnovaty-Kogan, “Radiative effects in supersonic wind accretion onto gravitating objects” *Astron. Astrophys.* **441**, 863–872 (2005).
11. R. V. E. Lovelace, M. M. Romanova, and G. S. Bisnovaty-Kogan, “Screening of the Magnetic Field of Disk Accreting Stars” *Astrophysical Journal*, **625**, 957-965 (2005).
12. V. V. Pupyshev, “Extrapolation of differential cross-section of triplet pp -scattering to low energies”, *JETP Letters*, **82**:5, 243 – 247 (2005).
13. V.V. Sokolov, V.G. Kurt, G.S. Bisnovaty-Kogan, Yu.N. Gnedin, Yu.V. Baryshev, T. A. Fatkhullin, V. S. Lebedev, Collimated high-energy photons and other possible observational effects of the photon angular and spectral distribution in gamma-ray bursts sources. *Bull. Spec. Astrophys. Obs.*, **59**, 5–16 (2005).
14. S. N. Yang, G. Y. Chen, S. S. Kamalov, L. Tiator, and D. Drechsel, “ S_{11} resonances in a coupled-channel dynamical model,” *Int. J. Mod. Phys. A* **20**, 1656-1661 (2005).

2.2 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”, *Fundamental and Applied Mathematics* (accepted).
2. Yu. V. Artemova, G. S. Bisnovaty-Kogan, I. V. Igumenshchev, and I. D. Novikov, “Black hole advective accretion disks with optical depth transition”, *Astrophys. J.* (accepted).
3. G. S. Bisnovaty-Kogan, “Binary and recycled pulsars: 30 years after observational discovery”, *Uspekhi Fiz. Nauk* (accepted).
4. D. Elsner, ..., S. S. Kamalov, *et al.*, “Measurement of the LT-asymmetry in π^0 electroproduction at the energy of the Δ (1232) resonance”, *Phys. Rev. Lett.* (accepted).
5. M. Khankhasayev, R. Herndon, J. Moerlins, and Chr. Teaf, “Overview of NATO/CCMS pilot study on environmental decision-making for sustainable development in Central Asia”, In: *Proc. Environmental Security and Sustainable Land Use: With Special Reference to Central Asia, NATO Security through Science Series, Sub-Series C: Environmental Security, vol. 7*, Eds. H. Vogtmann and N. Dobretsov, Springer (to appear in April 2006).
6. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Scattering length for helium atom-diatom collision”, *Few-Body Systems* (accepted).
7. V. Kostykin, K. A. Makarov, and A. K. Motovilov, “Perturbation of spectra and spectral subspaces”, *Transactions of the American Mathematical Society* (accepted).
8. A. K. Motovilov, “Explicit representations for the T-matrix on unphysical energy sheets and resonances in two- and three-body systems”, *Few-Body Systems* (accepted).
9. J. Révai and N. Shevchenko, “Capture of slow antiprotons by helium atoms”, *Eur. Phys. J. D* (to appear in January 2006 issue)

2.3 Articles in paper collections/conference proceedings

1. V. B. Belyaev, A. F. Oskin, and W. Sandhas, “Binding of η_c mesons with light nuclei”, In: *Few-Body Problems in Physics (Proc. of 19th European Conf. on Few-Body Problems in Physics)*, *AIP Conf. Proc.* **768** (2005), 268.
2. V. B. Belyaev, S. B. Levin, and S. L. Yakovlev, “The continuum spectrum wave function of two heavy and one light charged particles”, In: *Few-Body Problems in Physics (Proc. of 19th European Conf. on Few-Body Problems in Physics)*, *AIP Conf. Proc.* **768** (2005), 427–429.
3. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Recent scattering results for helium three-atom systems”, In: *Few-Body Problems in Physics (Proc. of 19th European Conference on Few-Body Problems in Physics)*, *AIP Conf. Proc.* **768** (2005), 347.
4. A. V. Matveenkov, H. Fukuda, and E. O. Alt, “Low energy $\bar{p} + H$ collision in hyperspheroidal Coordinates”, In: *Low Energy Antiproton Physics (Proc. of the Eighth Int. Conf. on Low Energy Antiproton Physics)*, *AIP Conf. Proc.* **796** (2005), 330–333.

2.4 Preprints and data bases

1. S. Albeverio, A. K. Motovilov, and A. V. Selin, “The *a priori* $\tan \theta$ theorem for eigenvectors”, *arXiv: math.SP/0512545*.
2. V. B. Belyaev, A. F. Oskin, and W. Sandhas, “Binding of η_c meson with light nucleus”, *arXiv: hep-ph/0504028*.
3. G.S. Bisnovatyi-Kogan, “Checking the variability of the gravitational constant with binary pulsars”, *arXiv: gr-qc/0511072*.
4. G.S. Bisnovatyi-Kogan, S.G. Moiseenko, and N.V. Ardeljan, “Core collapse supernovae: magnetorotational explosion”, *astro-ph/0511173*.
5. G. S. Bisnovatyi-Kogan and O. Yu. Tsupko, “Approximate dynamics of dark matter ellipsoids”, *arXiv: astro-ph/0512309*.
6. S. I. Fedotov, O. I. Kartavtsev, and A. V. Malykh, “Effective three-body interactions in the α -cluster model for the ^{12}C nucleus”, *arXiv: nucl-th/0509021*.
7. R. V. E. Lovelace, M. M. Romanova, and G. S. Bisnovatyi-Kogan, “Screening of the magnetic field of disk accreting stars”, *arXiv: astro-ph/0508168*.
8. V. S. Melezhik, “Quantum scattering problem without partial-wave analysis”, *arXiv: physics/0512019*.
9. V. V. Pupyshev, “Extrapolation of differential cross-section of triplet pp -scattering to low energies”, *JINR Preprint P4-2005-115*.
10. V. V. Pupyshev, “Coulomb-Multipole Analogues of Mott Effect”, *JINR Preprint P4-2005-128*.
11. V. V. Pupyshev, “Spurious solutions of three-dimensional Faddeev equations”, *JINR Preprint P5-2005-139*.
12. S. N. Yang and S. S. Kamalov, “Dynamical study of $\gamma^*N \leftrightarrow \Delta$ transition with $N(e, e'p)\pi$,” *arXiv: hep-ph/0509318*.

2.5 Conference presentations

1. G. S. Bisnovatyi-Kogan, “Evolution of magnetic fields of neutron stars”, Conference on Physics of Neutron Stars – 2005 (June 27-29, 2005, St. Petersburg, Russia).
2. G. S. Bisnovatyi-Kogan, “Recycled pulsars: observational properties and evolution”, Proc. of the Workshop “Gravity, astrophysics and strings at the Black Sea” (June 13-20, 2005, Bulgaria).
3. G. S. Bisnovatyi-Kogan, “Magnetorotational Supernovae”, KITP Program: Physics of Astrophysical Outflows and Accretion Disks, (April 4 - July 29, 2005, Santa Barbara, USA);

4. G. S. Bisnovatyi-Kogan, S. G. Moiseenko, and N. V. Ardeljan, “Core collapse supernovae: magnetorotational explosion”, Proc. of the Workshop “Gravity, astrophysics and strings at the Black Sea” (June 13-20, 2005, Bulgaria).
5. G. S. Bisnovatyi-Kogan, S. G. Moiseenko, and N. V. Ardeljan, ”Magnetorotational supernovae explosions”, The 12th Russian Gravitational Conference — International Conference on Gravitation, Cosmology and Astrophysics Dedicated to the 100th Anniversary of SR and 90th Anniversary of GR within the World Year of Physics (June 20-26, 2005 , Kazan’, Russia).
6. M. Khankhasayev, “Central Asian Pilot Study: A Five Year Historical Perspective”, NATO/CCMS Pilot Study Meeting: “Transboundary Water Management Issues in the United States and Central Asia: Problem Definition, Regulation and Management”, (March 8-10, 2005, Tallahassee, Florida, USA).
7. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Scattering length for helium atom-diatom collision”, International Workshop “Critical Stability of Few-Body Quantum Systems” (October 17-22, 2005, Dresden, Germany).
8. E. A. Kolganova, A. K. Motovilov, and W. Sandhas, “Scattering length for atom-diatom scattering at ultra-low energies”, Advanced Study Institute “Symmetries and Spin” (July 27 – August 3, 2005, Prague, Czech Republic).
9. A. V. Matveenکو, H. Fukuda, and E. O. Alt, “Low energy $\bar{p} + H$ collision in hyperspheroidal Coordinates”, Eighth International Conference on Low Energy Antiproton Physics, (May 16–22, 2005, Bonn, Germany).
10. V. S. Melezhik, “Ionization and excitation/deexcitation of hydrogen and helium by slow antiprotons”, International Conference on Exotic Atoms EXA05 (February 21–25, 2005, Vienna, Austria).
11. A. K. Motovilov, “Perturbation of Spectral Subspaces: Some Sharp Estimates”, Workshop in Spectral Theory of PDE (September 22, 2005, KTH, Stockholm, Sweden).
12. A. K. Motovilov, “Structure of the Scattering Matrix on Unphysical Energy Sheets and Resonances in Three-Body Systems”, Invited lecture at the International Workshop “Critical Stability of Few-Body Quantum Systems” (October 17-22, 2005, Dresden, Germany).
13. N. V. Shevchenko and J. Révai, “Capture of slow antiprotons by helium atoms”, International conference on Low Energy Antiproton Physics, (May 16–22, 2005, Bonn-Jülich, Germany).

3 Visits

3.1 Conferences, schools

1. G. S. Bisnovatyi-Kogan, Conference on Physics of Astrophysical Outflows and Accretion Disks (23–27 May 2005, Kavli Inst. Theor. Phys., Santa Barbara).
2. G. S. Bisnovatyi-Kogan, Intern. Workshop “Gravity, astrophysics and strings at the Black Sea” (13–20 June 2005, Bulgaria).

3. G. S. Bisnovaty-Kogan, Conference on Physics of Neutron Stars - 2005, June 27-29, 2005, St. Petersburg, Russia.
4. G. S. Bisnovaty-Kogan, The 12th Russian Gravitational Conference — International Conference on Gravitation, Cosmology and Astrophysics Dedicated to the 100th Anniversary of SR and 90th Anniversary of GR within World Year of Physics (20–26 June 2005, Kazan', Russia).
5. E. A. Kolganova, Advanced Study Institute “Symmetries and Spin”, (27 July – 3 August 2005, Prague, Czech Republic).
6. E. A. Kolganova, International Workshop “Critical Stability of Few-Body Quantum Systems” (17–22 October 2005, Dresden, Germany).
7. A. V. Matveenکو, Eighth International Conference on Low Energy Antiproton Physics (16–22 May 2005, Bonn, Germany).
8. V. S. Melezhik, International Conference on Exotic Atoms EXA05 (21–25 February 2005, Vienna, Austria).
9. A. K. Motovilov, International Workshop “Critical Stability of Few-Body Quantum Systems” (17–22 October, 2005, Dresden, Germany).
10. N. V. Shevchenko, International Conference on Low Energy Antiproton Physics (16–22 May 2005, Bonn-Jülich, Germany).

3.2 Collaboration visits

1. V. B. Belyaev, Institute for nuclear physics, Řež near Prague, Chech Republic, 16.10.2005 – 31.10.2005.
2. V. B. Belyaev, Theoretical Physics Department, KFKI, Budapest, Hungary, 01.11.2005–04.11.2005.
3. V. B. Belyaev, Physikalisches Institut, Universität Bonn, Bonn, Germany, 27.11.2005–10.01.2006.
4. G. S. Bisnovaty-Kogan, University of California, Santa Barbara, USA, 04.04.2005–31.05.2005
5. G. S. Bisnovaty-Kogan, Physics Department, University La Sapienza, Rome, Italy 08.10.2005–07.12.2005.
6. S. S. Kamalov, Taipei National University, Taipei, Taiwan, 11.03.2005–08.06.2005
7. S. S. Kamalov, Institute of Nuclear Physics, Mainz University, Mainz, Germany, 14.07.2005–14.09.2005.
8. S.S. Kamalov, Institute of Nuclear Physics, Mainz University, Mainz, Germany, 14.10.2005–17.12.2005.
9. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 25.03.2005–23.04.2005.

10. E. A. Kolganova, Max-Planck-Institute for the Physics of Complex Systems, Dresden, Germany, 03.10.2005–29.11.2005.
11. E. A. Kolganova, Physics Institute, Bonn University, Bonn, Germany, 10.11.2005–15.11.2005.
12. A. V. Malykh, Theoretical Physics Department, KFKI, Budapest, Hungary, 30.10.2005 – 09.11.2005.
13. A.V. Matveenko, University of Wroclaw, Poland, 13.04.2005 – 28.04.2005.
14. A. V. Matveenko, University of Mainz, Mainz, Germany, 18.11.2005 – 28.11.2005.
15. V. S. Melezhik, Physical Chemistry Institute, Heidelberg University, Heidelberg, Germany, 17.05.2005 – 13.08.2005.
16. A. K. Motovilov, Physics Institute, Bonn University, Bonn, Germany, 02.05.2005 – 01.06.2005.
17. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 02.06.2004 – 09.06.2005.
18. A. K. Motovilov, Department of Physics, Stockholm University, Stockholm, Sweden, 10.09.2005 – 10.10.2005.
19. A. K. Motovilov, Institute for Physics and Astronomy, University of Aarhus, Aarhus, Denmark, 25.09.2005–30.09.2005.
20. A. K. Motovilov, Institute for Applied Mathematics, Bonn University, Bonn, Germany, 10.10.2004 – 07.11.2005.
21. N. V. Shevchenko, Theoretical Physics Department, Nuclear Physics Institute, Řež, Czech Republic, 14.04.2005 – 12.07.2005.
22. N. V. Shevchenko, Physics Institute, Bonn University, Bonn, Germany, 15.05.2005 – 15.06.2005.

4 Visitors

1. S.-M. Fei, Institute for Applied Mathematics, University of Bonn, Bonn, Germany, 13.08.2005–21.08.2005.
2. S. B. Levin, St. Petersburg State University, Russia, and University of Stockholm, Sweden, 27.06.2005–03.07.2005.
3. J. Revai, Theoretical Physics Department, KFKI, Budapest, Hungary, 25.06.2005–30.07.2005.
4. W. Sandhas, Bonn University, Germany, 15.06.2005–15.07.2005.



Seminars of Few-Body Community in BLTP

The list of seminars in 2005

2005

Feb 08

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

[V.S. Melezhik](#)

Ultracold atom-atom collisions in a nonresonant laser field

[abstract](#)

Mar 22

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

[G.S.Bisnovatyi-Kogan](#)

Core-collapse supernova explosion

[abstract](#)

Apr 05

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

[*N. Shevchenko \(BLTP JINR\)*](#)

Capture of slow antiprotons by helium atoms

[abstract](#)

Apr 12

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

[*Pupyshev V.V. \(BLTP JINR\)*](#)

Extrapolation of the triplet differential cross-section of pp-scattering in the low-energy region

[abstract](#)

Apr 26

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 15.00

[*V.V. Pupyshev*](#)

Functional expansions in few-body problem

[abstract](#)

Jul 21

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

E.A. Soloviev, University of Freiburg, Germany

Advanced adiabatic approach and its application in atomic and molecular physics

[abstract](#)

Aug 16

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

Shao-Ming Fei, Institute for Applied Mathematics, University of Bonn, Germany

Quantum Information and Quantum Entanglement

[abstract](#)

Sep 06

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

[S.A. Kalachev \(MSU\)](#)

Hypernuclei binding energies and ΛN , $\Lambda\Lambda$ interactions

[abstract](#)

Nov 01

Few Body Systems
Seminar of BLTP sector 11

the II Floor Auditorium, 11.00

A.A Gusev, M.S. Kaschiev and [S.I.Vinitsky](#)

Effective approximation for calculations of a hydrogen atom in a magnetic field

[abstract](#)

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