Armenia-BLTPh cooperation in mathematical physics

Smorodinsky-Ter Antonyan program – basic program for mutual visits

Several <u>DIAS-TH Schools "Supersymmetry and Integrability"</u> organized by the <u>Bogoliubov Laboratory of Theoretical Physics, JINR (Dubna)</u> and in the framework of the program <u>DIAS-TH</u>

2022: Organizers: A.P. Isaev (BLTP JINR) - co-chairman,S.O. Krivonos (BLTP JINR) - co-chairman, I.G. Pirozhenko (BLTP JINR) - scientific secretary, A.P. Nersessian (Yerevan Phys. Inst.)

Problems of (Supersymmetric) Integrable Systems
Armenia-Dubna Workshop, 24-26 December 2013

1. Zhirair Avetisyan (YSU Yerevan)
   "Universality:towards deeper understanding".

2. Tigran Hakobyan (YSU Yerevan)
   "SL(2,R) structure of integrals of motion in systems based on the conformal mechanics".

3. Nikolay Izmailian (YerPhI Yerevan)
   "Corner contribution in 2D Ising model with free boundary".

4. David Karakhanyan (YerPhI Yerevan)
   "New solutions to Yang-Baxter Equation,appearing at exceptional values of deformation parameter".

5. Artavazd Kostanyan (RAU Yerevan)
   "Impurity states and quantum transitions in the core/shell/shell quantum dot".

6. Yevgeny Mamasakhlisov (YSU Yerevan)
   "Kinetics of the long single - stranded RNA: steady state".

7. Levon Mardoyan (YSU Yerevan)

8. Armen Nersessian (YSU Yerevan)
   "Hamiltonian formulation of rigid particles".

9. David Petrosyan (JINR Dubna)
   "Classical Oscillator Problem on SO(2,2) hyperboloid".

10. George Poghosyan (YSU Yerevan)

11. Armen Saghatelian (YSU Yerevan)
    "Action-Angle variables for a particle near horizon of extreme black holes"

12. Hayk Sarkisyan (RAU Yerevan)
    "Spectral and current characteristics of quantum rings: effects of spin and curvature of space".

13. Vahagn Yeghikyan (YSU)
    "On examples of Universality in physical theories"

Armenia-BLTPh(JINR) Workshops

- Series of the biennial Workshops: ``Supersymmetries and Quantum Symmetries". Main organizer – E. Ivanov
  These SQS workshops were initiated by Victor Isaakovich Ogievetsky (1928-1996)

  The main topics are:
  1. String Theory
  2. Quantum and Geometric Aspects of Supersymmetric Theories
  3. Higher-Spin Theories
  4. Supersymmetric Integrable Models
  5. Quantum Groups and Noncommutative Geometry
  6. Standard Model and Its Supersymmetric Extensions

Participants: T.Hakobyan, D.Karakhanyan, H. Khudaverdian, A.Nersessian, L.Mardoyan, G.Poghosyan, R.Mkrtchyan, G. Sarkissyan, R.Manvelyan

- Series of JINR-Armenian Workshops "Supersymmetry in Integrable Systems –SIS" MainOrganizers – A.Nersessian, S.Krivonos, O.Lechtenfeld
- **SIS'10 at Yerevan State University from 24 to 28 August, 2010**
- **SIS'11 at Leibniz Universität Hannover from 01 to 04 August, 2011**
- **SIS'12 at Yerevan State University from 27 to 30 August, 2012**
- **SIS'13 at Leibniz Universität Hannover from 28 to 30 December, 2013**
- **SIS'14 at BLTP JINR from 15 to 17 September, 2014**
- **SIS'15 at Yerevan State University from 9 to 13 September, 2015**
- **SIS'16 at Leibniz Universität Hannover from 27 to 30 December, 2016**
- **SIS'18 at BLTP JINR from 13 to 16 August, 2018**

Main topics are:
- Supersymmetric Mechanics
- Classical and Quantum Integrable Systems
- Superfield Techniques
- Applications in Field Theory and Condensed Matter Physics

The series of International Conferences on Symmetry Methods in Physics (SYMPHYS), were organized by the International Center for Advanced Studies at Alikhanyan Laboratory in collaboration with the Laboratory of Theoretical Physics of the Joint Institute for Nuclear Research. (G.Pogosyan)

Joint Publications

15 papers by S.Krivonos (N.Kozyrev, A.Sutulin) and A.Nersessian (V.Ohanyan, V.Yeghikyan, H.Shmavonyan, E.Khastyan, T.Hakobyan, A.Yeranyan)

1. 2k-dimensional N=8 supersymmetric quantum mechanics
S. Bellucci, S. Krivonos, A. Nersessian, A. Shcherbakov, Proceedings of 11th International Conference on Symmetry Methods in Physics (SYMPHYS-11), Prague, Czech Republic, 21-24 Jun 2004., 2004

2. N=8 supersymmetric mechanics on special Kähler manifolds
Stefano Bellucci, Sergey Krivonos, Armen Nersessian, Phys.Lett. B605 (2005) 181-184, 2004

3. N=4 supersymmetric mechanics with nonlinear chiral supermultiplet
S. Bellucci, A. Beylin, S. Krivonos, A. Nersessian, E. Orazi, Phys.Lett. B616 (2005) 228-232, 2005

4. Multi-center MICZ-Kepler system, supersymmetry and integrability.
Sergey Krivonos Armen Nersessian Vadim Ohanyan, Phys. Rev. D, D75, 085002, 2006

5. N=4 supersymmetric MICZ-Kepler systems on S^3.
Stefano Bellucci Sergey Krivonos Vadim Ohanyan, Phys. Rev. D, D76, 105023, 2007

6. Isospin particle systems on quaternionic projective spaces
Stefano Bellucci, Sergey Krivonos, Armen Nersessian, Vahagn Yeghikyan, Physical Review D, Изд:APS, D87, 045005-0450011, 2013

7. Supermembrane in D=5: component action
S. Bellucci, N. Kozyrev, S. Krivonos, A. Yeranyan, Journal of High Energy Physics, ISSN:1126-6708, eISSN:1029-8479, Изд:Springer, 1405, 142-160, 2014

8. Higher-derivative N=4 superparticle in three-dimensional spacetime
N. Kozyrev, S. Krivonos, O. Lechtenfeld, A. Nersessian, Physical Review D, 89, 045013-045024, 2014

9. SU(1,2) invariance in two-dimensional oscillator
S.Krivonos, A.Nersessian, JHEP, 1702, 006, 2017

10. Curved Witten-Dijkgraaf-Verlinde-Verlinde equation and N=4 mechanics
Nikolay Kozyrev, Sergey Krivonos, Olaf Lechtenfeld, Armen Nersessian, Anton Sutulin, Phys.Rev.D, 96, 101702, 2017

11. N=4 supersymmetric mechanics on curved spaces
N. Kozyrev, S. Krivonos, O.Lechtenfeld, A. Nersessian, A. Sutulin, Physical Review D, 97, 8, 085015, 2018

12. Geometry and integrability in N=8 supersymmetric mechanics
Sergey Krivonos, Armen Nersessian, Hovhannes Shmavonyan, Physical Review D, ISSN:1550-7998, eISSN:1550-2368, Изд:American Physical Society, 101, 4, 045002, 2020

13. Kahler geometry for su(1,N|M)-superconformal mechanics
E. Khastyan S.O.Krivonos A. Nersessian, Phys Rev D, 2021

14. Kahler geometry for su(1, N|M) superconformal mechanics
Erik Khastyan, Sergey Krivonos and Armen Nersessian, Physical Review D, ISSN:2470-0010, Изд:American Physical Society (United States), 105, 025007, 2022

15. Euler top and freedom in supersymmetrization of one-dimensional mechanics
Erik Khastyan, Sergey Krivonos, Armen Nersessian, Physics Letters A, ISSN:0375-9601, eISSN:1873-2429, Изд:Elsevier Science Limited, 452, 128442, 2022

1 paper by M. Avetisyan, A.P.Isaev, S.Krivonos, R.Mkrtchyan

The uniform structure of g^4
M.Avetisyan, A.Isaev, S.Krivonos, R.Mkrtchyan, arXiv:2311.05358, 2023

3 papers by E.Ivanov, S.Sidorov, A.Nersessian, H.Shmavonyan

1. Symmetries of deformed supersymmetric mechanics on K"ahler manifolds
   Evgeny Ivanov, Armen Nersessian, Stepan Sidorov, Hovhannes Shmavonyan, Phys.Rev. D, Изд:APS, 101, 025003, 2020
2. Quantum SU(2|1) supersymmetric C^N Smorodinsky-Winternitz system
   Evgeny Ivanov, Armen Nersessian, Stepan Sidorov, Journal of High Energy Physics, ISSN:1029-8479 (Online), Изд:the International School for Advanced Studies (SISSA - Trieste, Italy), published by Springer Berlin Heidelberg, 01, 015, 2021
3. CPN-Rosochatius system, superintegrability, supersymmetry, *Evgeny Ivanov, Armen Nersessian, Hovhannes Shmavonyan,* Phys.Rev. D, Изд:APS, 99, 085007, 2019

9 papers by G.Sarkissian and   V.P. Spiridonov

1. The endless beta integrals
G.A. Sarkissian, V.P. Spiridonov, Symmetry, Integrability and Geometry: Methods and Applications (SIGMA), ISSN:1815-0659, Изд:The European Mathematical Information Service, 16, 74, 21 pages, 2020

2. Complex hypergeometric functions and integrable many-body problems
G.A. Sarkissian and V.P. Spiridonov, Journal of Physics A: Mathematical and Theoretical, ISSN:1751-8113, eISSN:1751-8121, Изд:IOP Publishing, 55, 38, 385203, 2022

3. A parafermionic hypergeometric function and supersymmetric 6j-symbols
Elena Apresyan, Gor Sarkissian, Vyacheslav P. Spiridonov, Nuclear Physics B, ISSN:0550-3213, eISSN:1873-1562, Изд:Elsevier Science Limited, 990, 116170, 2023

4. Модулярная группа и гиперболический бета-интеграл
Г. А. Саркисян, В. П. Спиридонов, Успехи Математических наук, ISSN:0042-1316, Изд:Наука, 75, 3, 187-188, 2020

5. Общий модулярный квантовый дилогарифм и бета-интегралы
Г. А. Саркисян, В. П. Спиридонов, Труды Математического Института Российской академии наук им. Стеклова, ISSN:0371-9685 (print), Изд:Математический институт им. В.А. Стеклова Российской академии наук, 309, 269-289, 2020

6. Рациональные гипергеометрические тождества
Г. А. Саркисян, В. П. Спиридонов, Функциональный анализ и его приложения, ISSN:0374-1990, Изд:наука, 55, 3, 91-97, 2021

7. Эллиптическая гипергеометрическая функция и 6j-символы для группы SL(2,C)
С.Э. Деркачев, Г.А. Саркисян, В.П. Спиридонов, Теоретическая и Математическая физика, ISSN:0564-6162, Изд:МАИК НАУКА, 213, 1, 108-128, 2022

8. Elliptic and Complex Hypergeometric Integrals in Quantum Field Theory.
Sarkissian, G.A., Spiridonov, V.P, Physics of Particles and Nuclei Letters, ISSN:1547-4771, Изд:© Pleiades Publishing, Ltd., 20, 3, 281-286, 2023

9. Supersymmetric Liouville Field Theory and Racah–Wigner Symbols
E. Apresyan, G. Sarkissian and V.P. Spiridonov, Physics of Particles and Nuclei, ISSN:1063-7796, Изд:© Pleiades Publishing, Ltd., 54, 6, 1072-1076, 2023