Curriculum Vitae of Dmitry Shirokov

Work Address
1) HSE University,
legal address: 20 Myasnitskaya Ulitsa, Moscow, 101000, Russia, +7(495)7713232,
address: 11 Pokrovksy Bulvar, Moscow, 109028, Russia,
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2) Institute for Information Transmission Problems of Russian Academy of Sciences,
address: Bolshoy Karetny per. 19, Moscow, 127051, Russia, +7(495)6504225, shirokov@iitp.ru

Date and place of birth: 05.05.1987, Moscow, Russia
Personal email: dm.shirokov@gmail.com, dm.shirokov2021@gmail.com
Personal pages: https://www.hse.ru/en/staff/shirokov,   http://mathnet.ru/eng/person52747

EDUCATION AND ACADEMIC DEGREES

HSE University   10.2023
D.S. (Doctor of Science in Applied Mathematics),
Specialty: 1.1.2 Differential equations and mathematical physics,
Thesis theme: "Some algebro-geometric methods in field theory and other applications".

Steklov Mathematical Institute of Russian Academy of Sciences   05.2013
Ph.D. (Candidate of Physical and Mathematical Sciences),
Specialty: 01.01.03 Mathematical physics,
Thesis theme: "Some problems of the theory of Clifford algebras arising in the field theory".

Steklov Mathematical Institute of Russian Academy of Sciences   2009–2012
Postgraduate level, Department of Mathematical Physics, Supervisor: Prof. N. G. Marchuk.

Steklov Mathematical Institute of Russian Academy of Sciences   2007–2013
Successfully passed 17 advanced courses in Research and Educational Center
of Steklov Mathematical Institute of Russian Academy of Sciences.

Lomonosov Moscow State University   2004–2009
Faculty of Mechanics and Mathematics, Specialty: Mechanics. With high honors.

EMPLOYMENT

HSE University, Moscow,   01.2015–present
- Department of Mathematics, Faculty of Economic Sciences:
  Senior Lecturer (2015–2016), Associate Professor (2016–2024), Senior Research
  Fellow (2021–2024), Professor (2024–present).
- Laboratory for Geometric Algebra and Applications, Faculty of Economic Sciences:
  Laboratory Head (2024–present), Senior Research Fellow (2025–present),

Kharkevich Institute for Information Transmission Problems of Russian   01.2014–present
Academy of Sciences, Moscow,
- Laboratory 7: Researcher (2014–2015),
- Pinsker Laboratory 1: Senior Researcher (2015–present).

Bauman Moscow State University, Moscow,   02.2014–08.2016
- Department of Higher Mathematics, Faculty of Fundamental Sciences:
  Assistant (2014), Associate Professor (2014–1016).

GRANTS AND AWARDS

Head of projects:
- project "Quaternions, geometric algebras, and applications" within the competition "Mirror Laboratories" of HSE University, — 07.2024–12.2026
- grant 24-00-001 of the HSE Academic Fund Programme, Research and Study Group "Clifford algebras and applications", — 01.2024–12.2025
- grant 23-71-10028 of the Russian Science Foundation "Algebraic and geometric methods in field theory and other applications", — 07.2023–06.2026
- grant 22-00-001 of the HSE Academic Fund Programme, Research and Study Group "Clifford algebras and applications", — 01.2022–12.2023
- grant 21-71-00043 of the Russian Science Foundation "Algebraic and geometric methods in theory of Yang–Mills equations", — 07.2021–06.2023
- grant MK-404.2020.1 of the President of the Russian Federation "Some problems of the theory of Clifford algebras arising in mathematical physics", — 01.2020–12.2021
- grant 20-01-003 of the HSE Academic Fund Programme, Individual Research Project "Computational problems in Clifford algebra theory", — 01.2020–12.2021
- grant 20-11-00009 of the Russian Foundation for Basic Research for publishing the book "Theory of Clifford algebras and spinors", — 01.2020–12.2020
- grant 18-71-00010 of the Russian Science Foundation "Algebraic and geometric methods in the theory of nonlinear equations of mathematical physics", — 07.2018–06.2020
- grant 17-01-0009 of the HSE Academic Fund Programme, Individual Research Project "Lie groups and Lie algebras in Clifford algebras", — 01.2017–12.2018
- grant 16-31-00347 of the Russian Foundation for Basic Research, "Algebraic and geometric methods in field theory", — 01.2016–12.2017

Scientific consultant of projects:
- initiative collective research project of HSE students "Clifford algebras: computational problems and applications". — 04.2021–12.2021

Performer of projects:
- grant 14-11-00687 of the Russian Science Foundation. — 2014–2016
- grant NSh-2928.2012.1 of the President of RF for the Leading Scientific Schools, — 2012–2013
- grant 8215 of Ministry of Education and Science of the Russian Federation, — 2012–2013
- grant 11-01-00828-a of the Russian Foundation for Basic Research, — 2011–2013

Awards and Accomplishments at the HSE University:
- Best teacher, — 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024
- Winner of the HSE University Best Russian Research Paper Competition, — 2022, 2023
- Young Faculty Support Program (Group of Young Academic Professionals),
  - Category "Future Professoriate", — 2018–2019
  - Category "New Lecturers under 30", — 2016–2017
- Allowance for publication in a journal from List A (and equivalent scientific publications), — 2023–2024, 2024–2025
- Allowance for publication in an international peer-reviewed scientific journal, — 2018–2020, 2022–2023
- Allowance for an article in a foreign peer-reviewed scientific journal, — 2016–2017
- Academic allowance, — 2015–2016, 2017–2018
- Personal allowance of the rector, — 2021–2022
- Allowance for defending a doctoral dissertation, — 2023–2026
- Acknowledgment from the Department of Mathematics of the HSE University, — 02.2020
- Acknowledgment from the Faculty of Economic Sciences of the HSE University, — 01.2024

PROFESSIONAL EXPERIENCE

Head of:
- Laboratory for Geometric Algebra and Applications, FES, HSE University,   2024–present
  https://economics.hse.ru/gaa.
- Research and study group "Clifford algebra and applications", HSE University,   2022–present
  https://economics.hse.ru/clifford.
- Research working group "Algebro-geometric methods in applied sciences",   2023–2024
  FES, HSE University, https://economics.hse.ru/agm.

Organizer of:
- scientific seminar "Clifford algebra and applications", HSE University,   2021–present
  https://economics.hse.ru/clifford/seminar,
- scientific seminar "Quaternions, geometric algebras, and applications",   2024–present
  HSE University, https://economics.hse.ru/gaa/mirrorlab/#seminargaa.
- workshop ENGAGE 2023 (Empowering Novel Geometric Algebra for Graphics & Engineering,   2023
  http://www.cgs-network.org/cgi23/engage-workshop-cgi-2023) at the international
  conference CGI 2023 (Computer Graphics International, https://www.cgs-network.org/cgi23),
- school for students and young scientists "Quaternions, geometric algebras, and   2024
  applications", HSE University, Moscow, https://economics.hse.ru/en/gaaschool2024,
- parallel session "Clifford algebras, Clifford analysis and applications" at   2024
  The 33rd/35th International Colloquium on Group Theoretical Methods in Physics
  (ICGTMP, Group33/35), https://icgtmp.sciencesconf.org/resource/page/id/10.

Member of:
- advisory board of International Conference Series on Clifford Algebras and   2023–present
  Their Applications in Mathematical Physics (ICCA),
  https://projekte.uni-erfurt.de/icca/Advisory-board.html.
- scientific committee of international conference AGACSE (Applied Geometric Algebras   2024, 2026
  in Computer Science and Engineering),
  https://staff.fnwi.uva.nl/l.dorst/AGACSE2024/committee.html,
  http://www.mmrc.iss.ac.cn/agacse2026/committees.html,
- committee of workshop ENGAGE (Empowering Novel Geometric Algebra   2023, 2024, 2025
  for Graphics & Engineering), https://engage-workshop.org/) at the international
  conference CGI (Computer Graphics International, https://www.cgs-network.org/).
- academic committee of The 5th International Conference on Quaternion Matrix   2025
  Computations with Applications, Qufu, China,
  https://economics.hse.ru/mirror/pubs/share/1046645468.pdf.
- jury of the ENGAGE 2023 Prize,   2023
  https://www.cgs-network.org/cgi23/engage-workshop-cgi-2023/.
- jury of the W.K. Clifford Prize,   2023–present

Expert:
- of the Russian Science Foundation,   05.2024–present

Editorial:
- Associate Editor of the journal "Advances in Applied Clifford Algebras",   09.2023–present
  Switzerland, https://link.springer.com/journal/6/editorial-board
- Associate Editor of the journal "Journal of Geometry and Symmetry in Physics",   11.2021–present
  Bulgaria, http://geometry.imbm.bas.bg/jgsp/
- Review Editor for Mathematical Physics of the journals "Frontiers in Physics"   08.2022–present
  and "Frontiers in Applied Mathematics and Statistics", Switzerland,
  https://loop.frontiersin.org/people/1955313
- Guest Editor of the journal "Advances in Applied Clifford Algebras", Topical Collection   2023
  "ENGAGE 2023 Geometric Algebra for Computing, Graphics and Engineering",
- Editor of the book series "Lecture Notes in Computer Science" at the conference   2023
  Computer Graphics International 2023.

Refereeing for journals and book series:
- "Advances in Applied Clifford Algebras" (Switzerland), "Advances in Pure Mathematics" (China), "AIMS Mathematics" (United States), "Ain Shams Engineering Journal" (Egypt), "Applied Mathematics and Computation" (United States), "Applied Sciences" (MDPI, Switzerland), "Arab Journal of Basic and Applied Sciences" (United Kingdom), "Archiv der Mathematik" (Switzerland), "Axioms" (MDPI, Switzerland), "Communications in Theoretical Physics" (United States), "European Physical Journal Plus" (United States), "Extracta Mathematicae" (Spain), "IEEE Access" (United States), "International Journal of Modern Physics A" (Singapore), "Journal of Computational and Applied Mathematics" (Netherlands), "Journal of Geometry and Symmetry in Physics" (Bulgaria), "Journal of Mathematical Sciences: Advances and Applications" (India), "Journal of Mathematics" (Egypt), "Journal of Physics A: Mathematical and Theoretical" (United Kingdom), "Journal of Samara State Technical University" (Russia), "Journal of Taibah University for Science" (United Kingdom), "Lecture Notes in Computer Science (book series, Germany), "Linear Algebra and Its Applications" (Netherlands), "Linear and multilinear algebra" (United Kingdom), "Mathematical Methods in the Applied Sciences" (United Kingdom), "Mathematics" (MDPI, Switzerland), "Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science" (United Kingdom), "Proceedings of the Steklov Institute of Mathematics" (Russia), "Quasigroups and Related Systems" (Moldova), "Russian Mathematics" (Russia), "Scientific Reports" (Nature Publishing Group, United Kingdom), "Springer Proceedings in Mathematics & Statistics" (book series, USA), "The Bulletin of Udmurt University. Mathematics. Mechanics. Computer Science" (Russia), "Theoretical and Mathematical Physics" (Russia).

Internships and scientific visits:
- University College London, London, United Kingdom,   01.04–15.05.2018
- Chinese Academy of Sciences, Academy of Mathematics and Systems Science.   09.04–23.05.2019
  Beijing, China,

Lecturer of courses at the Steklov Mathematical Institute of Russian Academy of Sciences:
- "Clifford algebra and spinors", http://www.mathnet.ru/conf1192,   09–12.2011
- "Clifford algebras and field theory equations", http://www.mathnet.ru/conf1124,   09–12.2014
- "Foundations of the theory of Clifford algebras and spinors",   02–05.2021
  http://www.mathnet.ru/conf1898.

Lecturer at schools:
- international summer school "Hypercomplex Numbers, Lie Groups,   06.2017
  and Applications", Varna, Bulgaria, http://www.bio21.bas.bg/conference/school/
- school for students and young scientists "Quaternions, Geometric Algebras, and   11.2024
  Applications", HSE University, Moscow, https://economics.hse.ru/gaaschool2024.

Lecturer and seminarist of courses at the HSE University:
- "Linear algebra", Faculty of Economic Sciences,   2015–present
- "Linear algebra", Graduate School of Business (previously: "Algebra and geometry",   2015–2024
  Faculty of Business and Management),
- "Foundations of the theory of Clifford algebras", Magolego (Elective Course   2020, 2022
  for master students),
- "Foundations of the theory of Clifford algebras and spinors" (Open optional course). 2020, 2024, 2025

Seminarist of courses at the HSE University:
- "Mathematical analysis – 2", Faculty of Computer Science,   2015
- "Linear algebra and geometry", Faculty of Computer Science.   2015

Lecturer and seminarist of courses at the Bauman Moscow State University:
- "Analytic geometry",   2014, 2015
- "Mathematical analysis",   2015
- "Integrals and differential equations".   2014, 2016

Seminarist of courses at the Bauman Moscow State University:
- "Linear algebra and multivariable functions",   2014
- "Theory of probability and mathematical statistics",   2015

- "Theory of functions of a complex variable and operational calculus". 2015

BOOKS

1. Marchuk N. G., Shirokov D. S., *Theory of Clifford algebras and spinors* (in Russian), Krasand (URSS), Moscow, 560 pp., 2020, https://urss.ru/cgi-bin/db.pl?lang=en&blang=ru&page=Book&id=263794, ISBN 978-5-396-01014-7
2. Shirokov D. S., *Lectures on Clifford algebras and spinors* (in Russian), Lects. Kursy NOC 19, Steklov Math. Inst., RAS, Moscow, 2012, 180 pp., ISBN 978-5-98419-044-2, ISSN 2226-8782, https://doi.org/10.4213/book1373
3. Marchuk N. G., Shirokov D. S., *Introduction to the theory of Clifford algebras* (in Russian), Phasis, Moscow, 2012, 590 pp., ISBN 978-5-7036-0132-0

PUBLICATIONS IN PEER-REVIEWED JOURNALS

1. Marchuk N. G., Shirokov D. S., *Unitary spaces on Clifford algebras*, Advances in Applied Clifford Algebras, 18:2, 237–254, (2008), https://doi.org/10.1007/s00006-008-0066-y, arXiv:0705.1641
2. Shirokov D. S., Classification of elements of Clifford algebras according to quaternionic types, Dokl. Math., 80:1 (2009), 610–612, https://doi.org/10.1134/S1064562409040401
3. Shirokov D. S., *A classification of Lie algebras of pseudo-unitary groups in the techniques of Clifford algebras*, Advances in Applied Clifford Algebras, 20:2, 411–425 (2010), https://doi.org/10.1007/s00006-009-0177-0, arXiv:0705.3368
4. Shirokov D. S., *Theorem on the norm of elements of spinor groups*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 1(22), 2011, 165–171, https://doi.org/10.14498/vsgtu875
5. Shirokov D. S., *On some relations between spinor and orthogonal groups*, p-Adic Numbers, Ultrametric Analysis and Applications, 3:3, 212–218 (2011), https://doi.org/10.1134/S2070046611030058
6. Shirokov D. S., *Extension of Pauli's theorem to Clifford algebras*, Dokl. Math., 84, 2, 699–701 (2011), https://doi.org/10.1134/S1064562411060329
7. Shirokov D. S., *Quaternion typification of Clifford algebra elements*, Advances in Applied Clifford Algebras, 22:1, 243–256 (2012), https://doi.org/10.1007/s00006-011-0288-2, arXiv:0806.4299
8. Shirokov D. S., *Development of the method of quaternion typification of Clifford algebra elements*, Advances in Applied Clifford Algebras, 22:2, 483–497 (2012), https://doi.org/10.1007/s00006-011-0304-6, arXiv:0903.3494
9. Shirokov D. S., *Pauli theorem in the description of n-dimensional spinors in the Clifford algebra formalism*, Theoret. and Math. Phys., 175:1 (2013), 454–474, https://doi.org/10.1007/s11232-013-0038-9
10. Shirokov D. S. *The use of the generalized Pauli's theorem for odd elements of Clifford algebra to analyze relations between spin and orthogonal groups of arbitrary dimensions*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 1(30), 2013, 279–287, https://doi.org/10.14498/vsgtu1176
11. Shirokov D. S., *Generalization of Pauli's theorem on the case of Clifford algebras*, Nanostuctures. Mathematical physics and Modelling, 9:1 (2013), 93–104, https://nano-journal.ru/images/8/8e/94_pdfsam_Nano15.pdf
12. Shirokov D. S., *Calculation of elements of spin groups using generalized Pauli's theorem*, Advances in Applied Clifford Algebras, 25:1, 227–244 (2015), https://doi.org/10.1007/s00006-014-0471-3, arXiv:1409.2449
13. Shirokov D. S., *Contractions on ranks and quaternion types in Clifford algebras*, Vestn. Samar. Gos. Tekhn. Univ. Ser. Fiz.-Mat. Nauki, 19:1 (2015), 117–135, https://doi.org/10.14498/vsgtu1387
14. Shirokov D. S., *Symplectic, orthogonal and linear Lie groups in Clifford algebra*, Advances in Applied Clifford Algebras, 25:3, 707–718 (2015), https://doi.org/10.1007/s00006-014-0520-y, arXiv:1409.2452
15. Marchuk N. G., Shirokov D. S., *General solutions of one class of field equations*, Reports on mathematical physics, 78:3, 2016, 305–326, https://doi.org/10.1016/S0034-4877(17)30011-3, arXiv:1406.6665
16. Shirokov D., *On some Lie groups containing spin group in Clifford algebra*, Journal of Geometry and Symmetry in Physics, 42 (2016), 73–94, https://doi.org/10.7546/jgsp-42-2016-73-94, arXiv:1607.07363
17. Marchuk N., Shirokov D., *Constant solutions of Yang–Mills equations and generalized Proca equations*, Journal of Geometry and Symmetry in Physics, 42 (2016), 53–72, https://doi.org/10.7546/jgsp-42-2016-53-72, arXiv:1611.03070

5

18. Shirokov D. S., *Method of averaging in Clifford algebras*, Advances in Applied Clifford Algebras, 27:1, 149–163 (2017), https://doi.org/10.1007/s00006-015-0630-1, arXiv:1412.0246

19. Shirokov D. S., *Covariantly constant solutions of the Yang–Mills equations*, Advances in Applied Clifford Algebras, 28 (2018), 53, 16 pp., https://doi.org/10.1007/s00006-018-0868-5, arXiv:1709.07836

20. Shirokov D. S., *Classification of Lie algebras of specific type in complexified Clifford algebras*, Linear and multilinear algebra, 66:9, 1870–1887 (2018), https://doi.org/10.1080/03081087.2017.1376612, arXiv:1704.03713

21. Shirokov D. S., *Calculation of elements of spin groups using method of averaging in Clifford's geometric algebra*, Advances in Applied Clifford Algebras, 29 (2019), 50, 12 pp., https://doi.org/10.1007/s00006-019-0967-y, arXiv:1901.09405

22. Marchuk N. G., Shirokov D. S., *Local generalization of Pauli's Theorem*, Azerbaijan Journal of Mathematics, 10:1 (2020), 38–56, https://azjm.org/volumes/1001/pdf/1001-3.pdf, arXiv:1201.4985

23. Shirokov D. S., *On constant solutions of* SU(2) *Yang–Mills equations with arbitrary current in Euclidean space* $\mathbb{R}^n$, Journal of Nonlinear Mathematical Physics, 27:2 (2020), 199–218, https://doi.org/10.1080/14029251.2020.1700625, arXiv:1804.04620

24. Marchuk N. G., Shirokov D. S., *On some equations modeling the Yang–Mills equations*, Physics of Particles and Nuclei, 51:4 (2020), 589–594, https://doi.org/10.1134/S1063779620040498

25. Shirokov D. S., *A note on the hyperbolic singular value decomposition without hyperexchange matrices*, Journal of Computational and Applied Mathematics, 391 (2021), 113450, https://doi.org/10.1016/j.cam.2021.113450, arXiv:1812.02460

26. Shirokov D. S., *On inner automorphisms preserving fixed subspaces of Clifford algebras*, Advances in Applied Clifford Algebras, 31 (2021), 30, 23 pp., https://doi.org/10.1007/s00006-021-01135-6, arXiv:2011.08287

27. Shirokov D. S., *On computing the determinant, other characteristic polynomial coefficients, and inverse in Clifford algebras of arbitrary dimension*, Computational and Applied Mathematics, 40 (2021), 173, 29 pp., https://doi.org/10.1007/s40314-021-01536-0, arXiv:2005.04015

28. Shirokov D. S., *Basis-free solution to Sylvester equation in Clifford algebra of arbitrary dimension*, Advances in Applied Clifford Algebras, 31 (2021), 70, 19 pp., https://doi.org/10.1007/s00006-021-01173-0, arXiv:2109.01816

29. Shirokov D. S., *Hyperbolic Singular Value Decomposition in the Study of Yang—Mills and Yang—Mills—Proca Equations*, Computational Mathematics and Mathematical Physics, 62:6 (2022), 1007–1019, https://doi.org/10.1134/S0965542522060136

30. Abdulkhaev K. S., Shirokov D. S., *Basis-free Formulas for Characteristic Polynomial Coefficients in Geometric Algebras*, Advances in Applied Clifford Algebras, 32 (2022), 57, 27 pp., https://doi.org/10.1007/s00006-022-01232-0, arXiv:2205.13449

31. Filimoshina E. R., Shirokov D. S., *On Some Lie Groups in Degenerate Clifford Geometric Algebras*, Advances in Applied Clifford Algebras, 33 (2023), 44, 29 pp., https://doi.org/10.1007/s00006-023-01290-y, arXiv:2301.06842

32. Shirokov D. S., *Development of the method of averaging in Clifford geometric algebras*, Mathematics, 11(16): 3607 (2023), 18 pp., https://doi.org/10.3390/math11163607, arXiv:1409.8163

33. Shirokov D. S., *Classification of all constant solutions of* SU(2) *Yang–Mills equations with arbitrary current in pseudo-Euclidean space* $\mathbb{R}^{p,q}$, Modern Physics Letters A, 38:20n21 (2023), 2350096, 54 pp., https://doi.org/10.1142/S0217732323500967, arXiv:1912.04996

34. Filimoshina E. R., Shirokov D. S., *On generalization of Lipschitz groups and spin groups*, Mathematical Methods in the Applied Sciences, 47:3 (2024), 1375–1400, https://doi.org/10.1002/mma.8530, arXiv:2205.06045

35. Shirokov D. S., *On SVD and Polar Decomposition in Real and Complexified Clifford Algebras*, Advances in Applied Clifford Algebras, 34 (2024), 23, 20 pp., https://doi.org/10.1007/s00006-024-01328-9, arXiv:2404.11920

36. Shirokov D. S., *Noncommutative Vieta Theorem in Clifford Geometric Algebras*, Mathematical Methods in the Applied Sciences, 47:14 (2024), 11305–11320, https://doi.org/10.1002/mma.9221, arXiv:2301.06848

37. Filimoshina E. R., Shirokov D. S., *A Note on Centralizers and Twisted Centralizers in Clifford Algebras*, Advances in Applied Clifford Algebras, 34 (2024), 50, 22 pp., https://doi.org/10.1007/s00006-024-01345-8, arXiv:2404.15169

38. Rumyantseva S. V., Shirokov D. S., *Introducing Multidimensional Dirac-Hestenes Equation*, Advances in Applied Clifford Algebras, 35 (2025), 24, 20 pp., https://doi.org/10.1007/s00006-025-01382-x, arXiv:2411.04214

39. Shirokov D. S., *On Unitary Groups in Ternary and Generalized Clifford Algebras*, Advances in Applied Clifford Algebras, 35 (2025), 25, 19 pp., https://doi.org/10.1007/s00006-025-01388-5, arXiv:2504.19689

40. Shirokov D. S., *Calculation of Spin Group Elements Revisited*, International Journal of Geometric Methods in Modern Physics, 2025, https://doi.org/10.1142/S0219887825400316, arXiv:2412.02772

41. Shirokov D. S., *On Rank of Multivectors in Geometric Algebras*, Mathematical Methods in the Applied Sciences, 2025, https://doi.org/10.1002/mma.10946, arXiv:2412.02681

42. Filimoshina E. R., Shirokov D. S., *Generalized Degenerate Clifford and Lipschitz Groups in Geometric Algebras*, Advances in Applied Clifford Algebras, 35 (2025), 29, 35 pp., https://doi.org/10.1007/s00006-025-01390-x, arXiv:2505.07106

CONFERENCE PROCEEDINGS

1. Shirokov D. S., *Quaternion types of Clifford algebra elements, basis-free approach*, Proceedings of 9th International Conference on Clifford Algebras and their Applications in Mathematical Physics, Weimar, Germany, July 15–20, 2011, arXiv:1109.2322

2. Shirokov D. S., *Concepts of trace, determinant and inverse of Clifford algebra elements*, Progress in analysis. Proceedings of the 8th congress of the International Society for Analysis, its Applications, and Computation (ISAAC), Moscow, Russia, August 22–27, 2011. Volume 1. Burenkov, V. I. (ed.); Goldman, M. L. (ed.); Laneev, E. B. (ed.); Stepanov, V. D. (ed.), Moscow: Peoples' Friendship University of Russia (ISBN 978-5-209-04582-3/hbk), 2012, 187–194, arXiv:1108.5447

3. Shirokov D. S., *Clifford algebras and their applications to Lie groups and spinors*, Proceedings of the Nineteenth International Conference on Geometry, Integrability and Quantization (Varna, Bulgaria, June 2017), eds. I. Mladenov and A. Yoshioka, Avangard Prima, Sofia, Bulgaria, 2018, 11–53, https://doi.org/10.7546/giq-19-2018-11-53, arXiv:1709.06608

4. Shirokov D. S., *On basis-free solution to Sylvester equation in geometric algebra*, In: Magnenat-Thalmann N. et al. (eds) Advances in Computer Graphics. CGI 2020. Lecture Notes in Computer Science, vol 12221. Springer, Cham, 2020, 541–548, https://doi.org/10.1007/978-3-030-61864-3_46

5. Shirokov D. S., *A note on subspaces of fixed grades in Clifford algebras*, AIP Conference Proceedings (ICMM-2020, Yakutsk, Russia), 2328, 060001 (2021), ISBN: 978-0-7354-4072-2. https://doi.org/10.1063/5.0042103

6. Abdulkhaev K. S., Shirokov D. S., *On explicit formulas for characteristic polynomial coefficients in geometric algebras*, In: Magnenat-Thalmann N. et al. (eds) Advances in Computer Graphics. CGI 2021. Lecture Notes in Computer Science, vol 13002. Springer, Cham, 2021, 670–681, https://doi.org/10.1007/978-3-030-89029-2_50

7. Shirokov D. S., *On solutions of the Yang–Mills equations in the algebra of h-forms*, Journal of Physics: Conference Series (International Conference "Marchuk Scientific Readings 2021" (MSR-2021) 4–8 October 2021, Novosibirsk, Russian Federation), 2099, IOP Publishing, 2021, 012015, https://doi.org/10.1088/1742-6596/2099/1/012015

8. Shirokov D. S., *On Noncommutative Vieta Theorem in Geometric Algebras*, Empowering Novel Geometric Algebra for Graphics and Engineering. ENGAGE 2022. Lecture Notes in Computer Science, 13862, eds. Hitzer, E., Papagiannakis, G., Vasik, P., Springer, Cham, 2023, 28–37, https://doi.org/10.1007/978-3-031-30923-6_3

9. Shirokov D. S., *On Singular Value Decomposition and Polar Decomposition in Geometric Algebras*, In: Sheng, B., Bi, L., Kim, J., Magnenat-Thalmann, N., Thalmann, D. (eds) Advances in Computer Graphics. CGI 2023. Lecture Notes in Computer Science, vol 14498. Springer, Cham, 2024, 391–401, https://doi.org/10.1007/978-3-031-50078-7_31

10. Filimoshina E. R., Shirokov D. S., *On some Lie groups in degenerate geometric algebras*, In: Silva, D.W., Hitzer, E., Hildenbrand, D. (eds) Advanced Computational Applications of Geometric Algebra.

ICACGA 2022. Lecture Notes in Computer Science, vol 13771. Springer, Cham, 2024, 186–198, https://doi.org/10.1007/978-3-031-34031-4_16

11. Shirokov D., *On SU(3) in Ternary Clifford Algebra*, In: Magnenat-Thalmann, N., Kim, J., Sheng, B., Deng, Z., Thalmann, D., Li, P. (eds.) Advances in Computer Graphics. CGI 2024. Lecture Notes in Computer Science, 15340, Springer, Cham, 2025, 336–348, https://doi.org/10.1007/978-3-031-82024-3_26

12. Filimoshina E., Shirokov D., *Generalized Degenerate Clifford and Lipschitz Groups*, In: Magnenat-Thalmann, N., Kim, J., Sheng, B., Deng, Z., Thalmann, D., Li, P. (eds.) Advances in Computer Graphics. CGI 2024. Lecture Notes in Computer Science, 15340, Springer, Cham, 2025, 364–376, https://doi.org/10.1007/978-3-031-82024-3_28

13. Rumyantseva S., Shirokov D., *On Multidimensional Dirac–Hestenes Equation in Geometric Algebra*, In: Magnenat-Thalmann, N., Kim, J., Sheng, B., Deng, Z., Thalmann, D., Li, P. (eds.) Advances in Computer Graphics. CGI 2024. Lecture Notes in Computer Science, 15340, Springer, Cham, 2025, 364–376, https://doi.org/10.1007/978-3-031-82024-3_25

14. Shirokov D., *On Grade Automorphism in Ternary Clifford Algebras*, In: Faustino, N., Ferreira, M., Kähler, U., Vieira, N. (eds) Hypercomplex Analysis and Its Applications. Trends in Mathematics. Birkhäuser, Cham, 2025, https://doi.org/10.1007/978-3-031-86858-0_15

15. Filimoshina E., Shirokov D., *Equivariant Neural Networks with Geometric Algebras: A New Approach*, In: Proceedings of the International Joint Conference on Neural Networks, Rome, Italy, 2025, to appear.

16. Filimoshina E., Shirokov D., *GLGENN: A Novel Parameter-Light Equivariant Neural Networks Architecture Based on Clifford Geometric Algebras*, In: Proceedings of the 42nd International Conference on Machine Learning, Vancouver, Canada, 2025, to appear.

17. Abdulkhaev K. S., Shirokov D. S., *Explicit Formula for Inverse and Determinant in Geometric Algebras over Seven-dimensional Vector Spaces*, In: Advances in Computer Graphics. CGI 2025. Lecture Notes in Computer Science, Springer, Cham, to appear.

OTHER PREPRINTS

1. Shirokov D. S., *On constant solutions of* SU(2) *Yang–Mills–Dirac equations*, 19 pp., arXiv:2207.12313 (2023)

2. Sharma H., Shirokov D. S., *On Commutative Analogues of Clifford Algebras and Their Decompositions*, 28 pp., arXiv:2504.19763 (2025)

3. Sharma H., Shirokov D. S., *Determinant, Characteristic Polynomial, and Inverse in Commutative Analogues of Clifford Algebras*, 23 pp., arXiv:2412.20135 (2025)

CONFERENCE TALKS

1. Lomonosov Conference, Moscow State University, Department of Mechanics and Mathematics, 2008, Moscow, talk: *Method of quaternion typification of Clifford algebra elements*,

2. The Second International Conference on Mathematical Physics and Its Applications, August 29 – September 04, 2010, Samara, Russia, talk: *Structure of Euclidean and unitary space on hypercomplex number systems*

3. The 9th International Conference on Clifford Algebras and their Applications (ICCA), Weimar, Germany, July 15–20, 2011, talk: *Quaternion types of Clifford algebra elements, basis-free approach*,

4. 8th International ISAAC Congress, Moscow, August 22–27, 2011, talk: *Pauli's fundamental theorem for Clifford algebras*,

5. The 5th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2012), La Rochelle, France, July 2–4, 2012, talk: *Calculation of elements of spin groups using Generalized Pauli's theorem*, http://agacse2012.univ-lr.fr

6. School-Seminar "Interaction of Mathematics and Physics: New Perspectives" for graduate students and young researchers, Moscow, August 22–30, 2012, talk: *Generalization of Pauli's theorem on the case of Clifford algebra*,

7. The Third International Conference on Mathematical Physics and Its Applications, August 27 – September 2, 2012, Samara, Russia, talk: *Generalization of Pauli's theorem to the case of Clifford algebras*,

8. International conference "Representations, Dynamics, Combinatorics: in the Limit and Beyond" in honor of Anatoly Vershik's 80th birthday, June 9–14 , 2014, St. Petersburg, Russia, plenary talk (with academician V. P. Maslov): *Vershik's combinatorial approach and phase transitions in the classical thermodynamics*, http://www.pdmi.ras.ru/EIMI/2014/RDC/

9. The 10th International Conference on Clifford Algebras and their Applications (ICCA10), Tartu, Estonia, August 4–9, 2014, talk: *The method of contractions in Clifford algebras*,

10. The Fourth International Conference on Mathematical Physics and Its Applications, August 25 – September 1, 2014, Samara, Russia, talk: *Method of contractions in Clifford algebras with applications to the field theory equations*,

11. Physical And Mathematical Problems Of Advanced Technology Development (PhysMathTech-2014), devoted to the 50th Anniversary of the Scientific and Educational Division "Fundamental Sciences" of the Bauman Moscow State Technical University, November 17–19, 2014, Moscow, Russia, talk: *New class of gauge invariant solutions of Yang–Mills equations*,

12. Alterman Conference on Geometric Algebra and Summer School on Kähler Calculus, August 1–9, 2016, Brasov, Romania, talk: *On some Lie groups containing Spin groups in Clifford algebra*, http://www.xtec.cat/ rgonzal1/mirroralterman2016/

13. VI Russian-Armenian Conference on Mathematical Analysis, Mathematical Physics and Analytical Mechanics, September 11–16, 2016, Rostov-on-Don, Russia, talk: *Covariantly constant solutions of the Yang–Mills equations*, http://rus-arm.sfedu.ru/index_eng.html

14. International Conference "New trends in Mathematical and Theoretical Physics", October 3–7, 2016, Moscow, Russia, talk: *Covariantly constant solutions of the Yang–Mills equations*, http://www.mathnet.ru/eng/conf791

15. The 2nd French-Russian Conference "Random Geometry and Physics", October 17–21, 2016, Paris, France, talk: *On connection between two sets of higher-dimensional gamma matrices and a primitive field equation*, https://pperso.ijclab.in2p3.fr/page_perso/Rivasseau/RGP16/

16. International Summer School "Hypercomplex Numbers, Lie Groups, and Applications", June 9–12, 2017, Varna, Bulgaria, course of 5 lectures: *Introduction to the theory of Clifford algebras*, http://www.bio21.bas.bg/conference/school/

17. International Conference on Mathematical Modeling, July 4–8, 2017, Yakutsk, Russia, talk: *Local generalized Pauli's theorem and one field equation*, https://www.s-vfu.ru/universitet/nauka/mkmm2017/en/

18. The 11th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA11), August 1–11, 2017, Ghent, Belgium, talk: *Yang–Mills equations and Clifford algebras*, http://www.icca11.ugent.be

19. Operators, Functions, and Systems of Mathematical Physics Conference, May 21–24, 2018, Baku, Azerbaijan, talk: *On some solutions of Yang–Mills equations with SU(2) gauge symmetry*, https://sites.google.com/view/ofsmp2018/home

20. The 7th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2018), July 23–27, 2018, Campinas, Brazil, talk: *Calculation of elements of spin groups using method of averaging in Clifford's geometric algebra*, https://www.ime.unicamp.br/ agacse2018/

21. International conference "Modern Mathematical Physics. Vladimirov-95", November 12–16, 2018, Moscow, Russia, talk: *On some solutions of Yang–Mills equations with SU(2) gauge symmetry*, http://www.mathnet.ru/eng/conf1295

22. International Conference on Mathematical Methods in Physics, April 1–5, 2019, Marrakesh, Morocco, talk: *Method of averaging in Clifford algebras and applications*, http://www.icmmp2019.doodlekit.com/

23. International Symposium on Wen-Tsun Wu's Academic Thought and Mathematics Mechanization, May 12–17, 2019, Beijing, China, talk: *SVD and hyperbolic SVD for obtaining solutions of SU(2) Yang–Mills equations*, http://www.mmrc.iss.ac.cn/wu

24. The 2nd JNMP Conference on Nonlinear Mathematical Physics, May 26 – June 4, 2019, Santiago, Chile, talk: *On constant solutions of SU(2) Yang–Mills equations*, http://www.dmcc.usach.cl/JNMP-Conference-2019/

25. International Conference "Mathematical Physics, Dynamical Systems and Infinite-Dimensional Analysis", June 17–21, 2019, Dolgoprudny, Russia, talk: *On constant solutions of SU(2) Yang–Mills equations*,
https://mipt.ru/education/chair/mathematics/conf/matematicheskaya-fizika-dinamicheskie-sistemy/

26. 4th Alterman Conference on Computational and Geometric Algebra-cum-Workshop on Kähler Calculus, July 8–13, 2019, Manipal, India, plenary talk: *Method of averaging in Clifford algebras and applications*, https://conference.manipal.edu/alterman2019/Home

27. IX-th International Conference "Solitons, Collapses and Turbulence: Achievements, Developments and Perspectives" (SCT-19) in honor of Vladimir Zakharov's 80th birthday, August 5–9, 2019, Yaroslavl, Russia, talk: *Classification of all constant solutions of SU(2) Yang–Mills equations with arbitrary current*, https://lomonosov-msu.ru/eng/event/5298/

28. International Bogolyubov Conference "Problems of theoretical and mathematical physics", September 9–13, 2019, Moscow – Dubna, Russia, talk: *On constant solutions of SU(2) Yang–Mills equations*, http://theor.jinr.ru/ bog2019

29. 9th International Conference on Mathematical Modeling, July 27 – August 1, 2020, Yakutsk, Russia, talk: *On determinant and inverses in Clifford algebras*,
https://www.s-vfu.ru/universitet/nauka/mkmm2020/en/

30. The 12th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA12), August 3–7, 2020, Hefei, China, talk: *On determinant, other characteristic polynomial coefficients, and inverses in Clifford algebras*, http://www.smartchair.org/hp/ICCA2020/

31. International Conference "Computer Graphics International (CGI) 2020", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, October 20–23, 2020, Geneva, Switzerland, talk: *On basis-free solution to Sylvester equation in geometric algebra*, http://www.cgs-network.org/cgi20/

32. International Conference on Mathematical Physics in Memory of Academic V. S. Vladimirov, November 23–27, 2020, Moscow, Russia, talk (with N. G. Marchuk): *On some equations modeling the Yang–Mills equations*, http://www.mathnet.ru/eng/conf1677

33. International Conference "Mathematical Physics, Dynamical Systems and Infinite-Dimensional Analysis 2021", June 30 – July 9, 2021, Dolgoprudny, Russia, talk: *On constant solutions of the Yang–Mills–Dirac equations*, http://www.mathnet.ru/eng/conf1918

34. International Conference "Computer Graphics International (CGI) 2021", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, September 6–10, 2021, Geneva, Switzerland, talk (joint talk, speaker K. Abdulkhaev, Runner Up Best Paper & Presentation Award of ENGAGE 2021): *On explicit formulas for characteristic polynomial coefficients in geometric algebras*, http://www.cgs-network.org/cgi21/

35. The 8th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2021), September 6–10, 2021, Brno, Czech Republic, talk: *On Lie groups defining inner automorphisms that leave invariant fundamental subspaces of geometric algebra*, http://agacse2021.fme.vutbr.cz/

36. International Conference "Marchuk Scientific Readings 2021" (MSR-2021), October 4–8, 2021, Academgorodok, Novosibirsk, Russia, talk: *Hyperbolic SVD for obtaining solutions of SU(2) Yang–Mills equations*, http://conf.nsc.ru/msr2021

37. International Conference "Computer Graphics International (CGI) 2022", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, September 12–16, 2022, Geneva, Switzerland, talk: *On Noncommutative Vieta Theorem in Geometric Algebras*,
http://www.cgs-network.org/cgi22/

38. International Conference of Advanced Computational Applications of Geometric Algebra (ICACGA 2022), October 2–5, 2022, Denver, USA, talk (joint talk, speaker E. Filimoshina): *On some Lie groups in degenerate geometric algebras*, https://icacga.org/

39. International Conference on Mathematical Methods in Physics, April 24–28, 2023, Marrakesh, Morocco, talk (joint talk, speaker E. Filimoshina): *On some Lie groups in degenerate geometric algebras*, https://icmmp23.com/

40. The 13th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA13), June 4–9, 2023, Holon, Israel, talk: *On constant solutions of the Yang–Mills–Dirac equations*, https://sites.google.com/view/icca13-holon

41. The 13th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA13), June 4–9, 2023, Holon, Israel, talk (joint talk, speaker E. Filimoshina, Best Presentation Award): *On some Lie groups in degenerate and non-degenerate Clifford algebras*

42. The 13th International Conference on Clifford Algebras and Their Applications in Mathematical Physics (ICCA13), June 4–9, 2023, Holon, Israel, talk (joint talk, speaker K. Abdulkhaev): *Basis-Free Formulas for Characteristic Polynomial Coefficients in Clifford Algebras*

43. III International Conference "Mathematical Physics, Dynamical Systems, Infinite-Dimensional Analysis", dedicated to the 100th anniversary of V.S. Vladimirov, the 100th anniversary of L.D. Kudryavtsev and the 85th anniversary of O.G. Smolyanov, July 5–13, 2023, Dolgoprudny, Russia, talk: *Classification of all constant solutions of SU(2) Yang–Mills equations*, http://www.mathnet.ru/eng/conf2256

44. The Second International Conference on W.K. Clifford's Geometric Algebra and Geographic Information Science (GAGIS II), August 23–25, 2023, Nanjing, China, talk: *On singular value decomposition and its modifications in geometric algebras*, http://www.gagis.cn/2nd/

45. International conference "Computer Graphics International (CGI) 2023", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, August 28 – September 1, 2023, Shanghai, China, talk: *On Singular Value Decomposition and Polar Decomposition in Geometric Algebras*, http://www.cgs-network.org/cgi23/engage-workshop-cgi-2023/

46. The International Conference on Hypercomplex Analysis and its Applications – Celebrating Paula Cerejeiras' 60th birthday, March 18–22, 2024, Aveiro, Portugal, talk: *On grade automorphism and unitary groups in ternary Clifford Algebras*, https://sites.google.com/view/ichaa-2024

47. International conference "Modern computational technologies of mathematical modeling" dedicated to the 75th anniversary of Professor V.I. Vasil'ev, June 4–9, 2024, Yakutsk, Russia, talk: *On singular value decomposition in Clifford algebras*, http://multiscalemr.ru/ru/svtmm/

48. International Conference "Computer Graphics International (CGI) 2024", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, July 1–5, 2024, Geneva, Switzerland, talk: *On SU(3) in Ternary Clifford Algebra*, http://www.cgs-network.org/cgi24/

49. International Conference "Computer Graphics International (CGI) 2024", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, July 1–5, 2024, Geneva, Switzerland, talk (joint talk, speaker E. Filimoshina): *Generalized Degenerate Clifford and Lipschitz Groups*

50. International Conference "Computer Graphics International (CGI) 2024", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, July 1–5, 2024, Geneva, Switzerland, talk (joint talk, speaker S. Rumyantseva): *On Multidimensional Dirac–Hestenes Equation in Geometric Algebra*

51. The 33rd/35th International Colloquium on Group Theoretical Methods in Physics (ICGTMP, Group33/35), July 15–19, 2024, Cotonou, Benin, talk: *On calculation of spin group elements*, https://icgtmp.sciencesconf.org/

52. The 9th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2024), August 27–29, 2024, Amsterdam, Netherlands, talk: *On rank of multivectors in geometric algebras*, https://staff.fnwi.uva.nl/l.dorst/AGACSE2024/

53. The 9th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2024), August 27–29, 2024, Amsterdam, Netherlands, talk (joint talk, speaker S. Rumyantseva): *On multidimensional Dirac-Hestenes equation*

54. The 9th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2024), August 27–29, 2024, Amsterdam, Netherlands, talk (joint talk, speaker E. Filimoshina): *On Generalized Degenerate Lipschitz and Spin Groups*

55. The 9th Conference on Applied Geometric Algebras in Computer Science and Engineering (AGACSE 2024), August 27–29, 2024, Amsterdam, Netherlands, talk (joint talk, speaker Heerak Sharma, Best Poster Prize): *Inverse of a Multivector*

56. School for students and young scientists "Quaternions, geometric algebras and applications", November 15–17, 2024, HSE University, Moscow, Russia, talk (joint talk, speaker E. Filimoshina): *Fundamental operations in Clifford algebras and their relation to matrices*, https://economics.hse.ru/en/gaaschool2024

57. The 5th International Conference on Quaternion Matrix Computations with Applications, May 9–12, 2025, Qufu, China, talk: *On calculation of spin group elements in terms of Clifford algebras, quaternions, and split-quaternions*, https://mp.weixin.qq.com/s/XhjoWEM5ZGVR0o-gHeQqPw

58. International Joint Conference on Neural Networks, June 30 – July 5, 2024, Rome, Italy, talk (joint talk, speaker E. Filimoshina): *Equivariant Neural Networks with Geometric Algebras: A New Approach*, https://2025.ijcnn.org/

59. 42nd International Conference on Machine Learning, July 13–19, 2025, Vancouver, Canada, talk (joint talk with E. Filimoshina): *GLGENN: A Novel Parameter-Light Equivariant Neural Networks Architecture Based on Clifford Geometric Algebras*, https://icml.cc/

60. International Conference "Computer Graphics International (CGI) 2025", Empowering Novel Geometric Algebra for Graphics & Engineering (ENGAGE) Workshop, July 14–18, 2025, Hong Kong, China, talk (joint talk, speaker K. Abdulkhaev): *Explicit Formula for Inverse and Determinant in Geometric Algebras over Seven-dimensional Vector Spaces*, https://www.cgs-network.org/cgi25/engage-workshop-2025/ (submitted)

61. 15th ISAAC Congress, July 21–25, 2025, Astana, Kazakhstan, talk: *On multidimensional Dirac–Hestenes equation*, https://isaac2025.org/

SELECTED SEMINAR TALKS

- Seminar of the Department of Mathematical Physics (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Academician V. S. Vladimirov, Corr. memb. of RAS I. V. Volovich, (2011, 2021), http://www.mathnet.ru/eng/conf129

- Seminar of the Department of Theoretical Physics (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairman: Academician A. A. Slavnov, (2012), http://www.mathnet.ru/eng/conf130

- Seminar of the Department of gas and wave dynamics (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), (2007–2009),

- Seminar of Department of Higher Algebra (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), (2010, 2012),

- Seminar "Classical and quantum dynamics in some problems of mathematical physics" (Research and Educational Center of Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Academician V. V. Kozlov, Corr. memb. of RAS I. V. Volovich, Prof. S. V. Kozyrev, Prof. O. G. Smolyanov, (2009–2015);

- Seminar "Infinite dimensional analysis and mathematical physics", Department of Function theory and functional analysis (Faculty of Mechanics and Mathematics, Lomonosov Moscow State University, Moscow), chairmen: Prof. O. G. Smolyanov, Prof. E. T. Shavgulidze, (2013, 2021, 2023), http://www.mathnet.ru/eng/conf542

- Seminar of Laboratory 5 "Integrable structures in statistical and field models" (Kharkevich Institute for Information Transmission Problems, Russian Academy of Sciences, Moscow), chairmen: Corr. memb. of RAS A. A. Belavin, Prof. A. B. Zamolodchikov, (2013), http://www.mathnet.ru/eng/conf355

- V. P. Mikhailov seminar (Steklov Mathematical Institute, Russian Academy of Sciences, Moscow), chairmen: Prof. A. K. Gushchin, Prof. V. V. Zharinov, (2018),

- Spectral Theory and PDE Seminar (Pontificia Universidad Catolica de Chile, Santiago, Chile), chairman: Prof. Georgi Raikov, (2019), https://www.mat.uc.cl/ graikov/seminar.html

- Seminar of Mathematics Mechanization Research Center, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China, chairman: Prof. Hongbo Li, (2019),

- Seminar "Clifford algebras and applications", HSE University, Moscow, chairman: D. S. Shirokov, (2021–), https://economics.hse.ru/clifford/seminar,

- Seminar "Perspective Mathematical Technologies", Laboratory of Mathematical Methods in Natural Science, HSE University, Moscow, chairman: Prof. V. G. Danilov, (2023), https://cfi.hse.ru/math-phys/seminars/2018

- Seminar "Supercomputer simulations in science and engineering", MIEM HSE, Moscow, chairman: Prof. L. N. Shchur, (2023), https://comphys.hse.ru/seminar

PARTICIPATION IN OTHER EVENTS

- Visiting Seminar of HSE Group of Young Academic Professionals "Effective approaches to involving students in scientific and project activities", HSE Study Center "Voronovo", Moscow, Russia, November 17–19, 2023, talk: *"How to grow a scientific team from student project: case of research and study group "Clifford Algebras and Applications"*, https://academics.hse.ru/hipo/news/874906626.html
- Visiting School of Scientific Leaders, Sirius, Sochi, Russia, November 25 – December 1, 2023, https://smu.corp-univer.ru/registration_sochi
- III Young Scientists Congress, Sirius, Sochi, Russia, November 28–30, 2023, participant of the School of Russian Science Foundation, https://congress.10nauki.ru/
- Visiting School of Scientific Leaders, Sochi, Russia, November 24–30, 2024, https://eventscientists.ru/
- IV Young Scientists Congress, Sirius, Sochi, Russia, November 27–29, 2024, https://congress.10nauki.ru/

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