Nikita Sopenko

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Personal information

Date of birth: April 24, 1995
Citizenship: Russian

Research interests: mathematical physics, quantum statistical mechanics, quantum field theory, operator algebra.

Employment

Institute for Advanced Study, Princeton, NJ, USA
Member, September 2023 - present

Education

California Institute of Technology, USA
Ph.D. in Physics, 2018 - 2023
Advisor: Anton Kapustin

Moscow Institute of Physics and Technology, Russia
B.S. and M.S. in Physics *(summa cum laude)*, 2012 - 2018

HONORS AND AWARDS

- Robert F. Christy Prize for Outstanding Doctoral Thesis in Theoretical Physics, California Institute of Technology (2023)

- John S. Stemple Memorial Prize for outstanding progress in research as demonstrated by an excellent performance on the oral candidacy exam, California Institute of Technology (2021)

- Dominic Orr Graduate Fellowship, California Institute of Technology (2018-2023)

- Academic Council fellowship, Moscow Institute of Physics and Technology (2015-2018)

- Abramov-Frolov fellowship, Moscow Institute of Physics and Technology (2012-2015)

- Young scientists scholarship, Institute for Theoretical and Experimental Physics (2014-2018)

- Gold medal at 43rd International Physics Olympiad (2012)

- European Physical Society Award for the Absolute winner of the Physics Cup - IPhO (2012)

- Gold medal at 13th Asian Physics Olympiad (2012)

- Gold medal and best result for the experimental exam, Romanian Masters of Physics (2012)

- Silver medal at 42nd International Physics Olympiad (2011)

- First Prize at All-Russian Physics Olympiad (2010, 2011, 2012)

- Second Prize at All-Russian Mathematics Olympiad (2010, 2012)

LIST OF PUBLICATIONS

- *Reflection positivity and a refined index for 2d invertible phases*
  N. Sopenko
  preprint arXiv:2509.01711

- *Optimal Bound on Long-Range Distillable Entanglement*
  Jonah Kudler-Flam, Vladimir Narovlansky, Nikita Sopenko
  Phys. Rev. Lett. 135, 060403 (2025)

- *An index for invertible phases of two-dimensional quantum spin systems*
  N. Sopenko
  preprint arXiv:2410.02059

- *Anomalous symmetries of quantum spin chains and a generalization of the Lieb-Schultz-Mattis theorem*
  A. Kapustin, N. Sopenko
  Communications in Mathematical Physics, Volume 406, article number 238, (2025)

- *Quantization of the higher Berry curvature and the higher Thouless pump*
  A. Artymowicz, A. Kapustin, N. Sopenko
  Communications in Mathematical Physics, Volume 405, article number 191, (2024)

- *Chiral topologically ordered states on a lattice from vertex operator algebras*
  N. Sopenko
  Advances in Theoretical and Mathematical Physics Vol.28, no.1 (2024)

- *Local Noether theorem for quantum lattice systems and topological invariants of gapped states*
  A. Kapustin, N. Sopenko
  Journal of Mathematical Physics, Volume 63, Issue 9, 091902 (2022) [Editors Pick]
  (special collection on Mathematical Aspects of Topological Phases)

- *An index for two-dimensional SPT states*
  N. Sopenko
  Journal of Mathematical Physics, Volume 62, Issue 11, 111901 (2021)

- *A classification of phases of bosonic quantum lattice systems in one dimension*
  A. Kapustin, N. Sopenko, B. Yang
  Journal of Mathematical Physics, Volume 62, Issue 8, 081901 (2021)

- *Hall conductance and the statistics of flux insertions in gapped interacting lattice systems*
  A. Kapustin, N. Sopenko
  Journal of Mathematical Physics, Volume 61, Issue 10, 101901 (2020) [Editors Pick]

- *Rozansky-Witten geometry of Coulomb branches and logarithmic knot invariants*
  S. Gukov, P.S. Hsin, H. Nakajima, S. Park, D. Pei, N. Sopenko
  Journal of Geometry and Physics, Volume 168, 104311 (2021)

- *3d-3d correspondence for mapping tori*
  S. Chun, S. Gukov, S. Park, N. Sopenko
  Journal of High Energy Physics, 2020 (9), pp.1-60

- *Bands and gaps in Nekrasov partition function*
  A. Gorsky, A. Milekhin, N. Sopenko
  Journal of High Energy Physics, 2018 (1), pp.1-43

- *Surface defects and instanton-vortex interaction*
  A. Gorsky, B. Le Floch, A. Milekhin, N. Sopenko
  Nuclear Physics B, 920, pp.122-156 (2017)

- *The Condensate from Torus Knots*
  A. Gorsky, A. Milekhin, N. Sopenko
  Journal of High Energy Physics 2015 (9), pp.1-41

TALKS AT CONFERENCES AND SEMINARS

- Simons Collaboration on Global Categorical Symmetries Satellite Meeting, New York University (November 2025)

- City College of New York, Physics department seminar (September 2025)

- Workshop on Quantum Field Theory and Topological Phases via Homotopy Theory and Operator Algebras, Harvard university (July 2025)

- Center of Mathematical Sciences and applications, Quantum Field Theory and Physical Mathematics Seminar, Harvard university (May 2025)

- Simons Center for Geometry and Physics, Journal Club, Stony Brook (March 2025)

- Rutgers University, New High Energy Theory Center (October 2024)

- Institute for Advanced Study CMP/QFT Seminar, Princeton (October 2024)

- University of Colorado Boulder, C^*-Algebraic Quantum Mechanics and Topological Phases of Matter, Lectures (July 2024)

- University of Chicago, Kadanoff seminar, Chicago (May 2024)

- Institute for Advanced Study CMP/QFT Seminar, Princeton (February 2024)

- CREST Tutorial Workshop "Theoretical studies of topological phases of matter", Japan (February 2024)

- Mathematical Physics Seminar, Princeton University (November 2023)

- Simons Center for Geometry and Physics, Physics Seminar, Stony Brook University (November 2023)

- Institute for Advanced Study High Energy Theory Seminar, Princeton (October 2023)

- QMAP seminar, UC Davis (May 2023)

- Seminar, Beijing Institute of Mathematical Sciences and Applications (April 2023)

- Condensed Matter Seminar, Perimeter institute (December 2022)

- Workshop "Topology and Entanglement in Many-Body Systems", Banff International Research Station, (October 2021)

- Seminar on non-perturbative methods in quantum field theory, IITP and Landau ITP, Moscow (October 2021)

- Global Non-commutative Geometry seminar, (May 2021)

- Seminar on non-perturbative methods in quantum field theory, IITP and Landau ITP, Moscow (July 2020)

- Seminar on representation theory and mathematical physics, Higher school of economics and Skoltech (2018)

- Séminaire de Physique Théorique, Institut des Hautes Études Scientifiques, Paris, France (April 2017)

- Seminar "Modern problems in quantum field theory", HSE Moscow (October 2015)

RESEARCH STAYS

- Kavli Institute for Theoretical Physics, Santa Barbara, CA, USA (6 weeks, 2017)

- Institut des Hautes Études Scientifiques, France (5 weeks, 2017)

TEACHING EXPERIENCE

- Teaching Assistant at Caltech 2020-2023

  PH232 Introduction to Topological Field Theory

  PH229 Advanced Mathematical Methods of Physics

  PH219 Quantum Computation

  PH127 Statistical Physics

- Teaching Assistant at Moscow Institute of Physics and Technology 2018

  Methods of Mathematical Physics

- Member of the academic committee of 18th Asian Physics Olympiad (2017)

- 2012 & 2013 International Physics Olympiad Russian team coach

PROFESSIONAL SERVICE

Referee for

- National Science Foundation proposals

- Communications in Mathematical Physics

- Reviews in Mathematical Physics

- Journal of High Energy Physics (JHEP)

- Physical Review Letters

- Physical Review B

- Physical Review D

LAST UPDATED: DECEMBER 17, 2025