

Curriculum Vitae

Personal information

First name: Yan

Last name: Rybalko

Date of birth: 25.06.1994

Citizenship: Ukrainian

Current position: Researcher at Mathematical Division of B. Verkin ILTPE of NASU

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Google Scholar ORCID Scopus

Research interests

My research focuses on the asymptotic analysis of nonlinear integrable PDEs, which is at the interface of inverse problems, analysis of differential equations and boundary value problems for analytic functions. Also in my recent work I investigate the well-posedness questions of the Cauchy problems for integrable dispersive equations.

Education

- 01 Nov. 2017 – 30 Jul. 2021 PhD in Mathematics at Mathematical Division of B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine. *Thesis title:* “Inverse scattering transform method for nonlocal integrable equations”. *Supervisor:* Professor Dmitry Shepelsky.
- Sept. 2015 – Jul. 2017 Master degree in Applied Mathematics at V.N. Karazin Kharkiv National University. *Thesis title:* “The long-time asymptotics for solutions of the integrable nonlocal nonlinear Schrödinger equation”. *Supervisor:* Professor Dmitry Shepelsky.
- Sept. 2011 – Jun. 2015 Bachelor degree in Applied Mathematics at V.N. Karazin Kharkiv National University. *Thesis title:* “Initial value problems for the non-stationary linear Schrödinger equation with a singular potential”. *Supervisor:* Professor Dmitry Shepelsky.

Academic Employment

- Jun. 2024 till now Senior researcher, Mathematical Division of B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine.
- Jan. 2022 – Jun. 2024 Researcher, Mathematical Division of B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine.
- Aug. 2021 – Dec. 2021 Junior researcher, Mathematical Division of B. Verkin Institute for Low Temperature Physics and Engineering of NAS of Ukraine.
- Feb. 2018 – Jun. 2018 Lecturer, Department of Mathematics and Informatics at V.N. Karazin Kharkiv National University. *Courses:* Calculus of Variations, Functional Analysis.

Articles in peer-reviewed journals

1. K.H. Karlsen, Ya. Rybalko, “On the well-posedness of the Cauchy problem for the two-component peakon system in $C^k \cap W^{k,1}$,” *Zeitschrift für angewandte Mathematik und Physik* **75**, 113 (2024). DOI 10.1007/s00033-024-02246-3
2. K.H. Karlsen, Ya. Rybalko, “On the well-posedness of a nonlocal (two- place) FORQ equation via a two-component peakon system,” *Journal of Mathematical Analysis and Applications* **529** (1), 127601 (2024). DOI 10.1016/j.jmaa.2023.127601
3. Ya. Rybalko, D. Shepelsky, “Global conservative solutions of the nonlocal NLS equation beyond blow-up,” *Discrete and Continuous Dynamical Systems* **43** (2), 860–894 (2023). DOI 10.3934/dcds.2022173
4. A. Boutet de Monvel, Ya. Rybalko and D. Shepelsky, “Focusing nonlocal nonlinear Schrödinger equation with asymmetric boundary conditions: large-time behavior,” In: Basor, E., Böttcher, A., Ehrhardt, T., Tracy, C.A. (eds) Toeplitz Operators and Random Matrices. *Operator Theory: Advances and Applications*, **289**, 193–227 (2022). Birkhäuser, Cham. DOI 10.1007/978-3-031-13851-5_11
5. Ya. Rybalko, D. Shepelsky, “Asymptotic stage of modulation instability for the nonlocal nonlinear Schrödinger equation,” *Physica D: Nonlinear Phenomena* **428**, 133060 (2021). DOI 10.1016/j.physd.2021.133060
6. Ya. Rybalko, D. Shepelsky, “Curved wedges in the long-time asymptotics for the integrable nonlocal nonlinear Schrödinger equation,” *Studies in Applied Mathematics* **147**, (3) 872–903 (2021). DOI 10.1111/sapm.12403
7. Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the integrable nonlocal focusing nonlinear Schrödinger equation for a family of step-like initial data,” *Communications in Mathematical Physics* **382**, 87–121 (2021). DOI 10.1007/S00220-021-03941-2
8. Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the integrable nonlocal nonlinear Schrödinger equation with step-like initial data,” *Journal of Differential Equations* **270**, 694–724 (2021). DOI 10.1016/j.jde.2020.08.003
9. Ya. Rybalko, D. Shepelsky, “Defocusing nonlocal nonlinear Schrödinger equation with step-like boundary conditions: long-time behavior for shifted initial data,” *Journal of Mathematical Physics, Analysis and Geometry* **16**, (4) 418–453 (2020). DOI 10.15407/mag16.04.418
10. Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the integrable nonlocal nonlinear Schrödinger equation,” *Journal of Mathematical Physics* **60**, 031504 (2019). DOI: 10.1063/1.5036705

11. Ya. Rybalko, “Initial value problem for the time-dependent linear Schrödinger equation with a point singular potential by the unified transform method,” *Opuscula Mathematica* **38**, (6) (2018). DOI: 10.7494/OpMath.2018.38.6.883

Reviewer

I reviewed papers for the journals “Communications in Mathematical Physics”, “Journal of Differential Equations”, “Physica D: Nonlinear Phenomena”, “Journal of Hyperbolic Differential Equations”, “Mathematische Nachrichten”, “Studies in Applied Mathematics”, “Communications in Nonlinear Science and Numerical Simulations”, “Journal of Mathematical Physics”, “Wave Motion”, “Journal of Pseudo-Differential Operators and Applications”, “SCIENCE CHINA Mathematics”, “Modern Physics Letters B” and “Symmetry”.

Honors

- The best young researcher of the Academy, awarded by the National Academy of Sciences of Ukraine, 2023
- Talent, Inspiration, Work, awarded by the National Academy of Sciences of Ukraine, 2023
- Research grant from N.I. Akhiezer Foundation, twice in 2023 and 2024
- Universities 4 Ukraine Non-Residential Fellowship, awarded by the University of California, Berkeley, 2022
- Horizon Marie Skłodowska-Curie Actions Postdoctoral Fellowship, call 2021 (notice that it is *not* the MSCA4Ukraine and the competition was global)
- Grant for the young scientists’ research projects, Jul. 2021 – Dec. 2022
- Prize of the National Academy of Sciences of Ukraine for young scientists, 2021
- Scholarship of N.I. Akhiezer Fund, thrice in 2015, 2020, 2022
- Graduated from V.N. Karazin Kharkiv National University with diploma cum laude, 2017

Conferences & Seminars

- Ya. Rybalko, “Global solutions of the nonlocal nonlinear Schrödinger equation,” Seminar at Mathematical Department of the Virginia Commonwealth University, October 06, 2023
- Ya. Rybalko, D. Shepelsky, “Global well-posedness of the nonlocal NLS equation,” Seminar at Mathematical Division of the B. Verkin ILTPE, January 25, 2023
- Ya. Rybalko, D. Shepelsky, “Focusing nonlocal NLS with step-like initial data: large time behavior,” New horizons in dispersive hydrodynamics, Isaac Newton Institute for Mathematical Sciences (Poster), Jun. 21–Jul. 2, 2021, Cambridge, United Kingdom

- Ya. Rybalko, D. Shepelsky, “Long-time evolution of the shifted step initial data for the nonlocal nonlinear Schrödinger equation,” International conference of young scientists, Institute of Mathematics, Jun 2–3, 2021, Kyiv, Ukraine
- Ya. Rybalko, “Cauchy problem for nonlocal nonlinear Schrödinger equation with step-like initial data: asymptotics and inverse scattering,” The conference of young scientists “Pidstryhach readings – 2021”, May 26–28, 2021, Lviv, Ukraine
- Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the integrable nonlocal nonlinear Schrödinger”, 6th Ya. B. Lopatynsky international school-workshop on differential equations and applications, Jun. 18–20, 2019, Vinnytsia, Ukraine
- Ya. Rybalko, D. Shepelsky, “The integrable nonlocal nonlinear Schrödinger equation: Riemann-Hilbert approach and long-time asymptotics”, Differential equations and control theory. V.Karazin Kharkiv National University, Sept. 25–27, 2018, Kharkiv, Ukraine
- Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the integrable nonlocal nonlinear Schrödinger equation with step-like initial data”, VI International conference. Analysis and mathematical physics. B. Verkin Inst. LTPE. Jun. 18–22, 2018
- Ya. Rybalko, D. Shepelsky, “Long-time asymptotics for the nonlocal nonlinear Schrödinger equation on the line”, V International conference. Analysis and mathematical physics. B. Verkin Inst. LTPE, V.Karazin Kharkiv National University. Jun. 19–24, 2017
- Ya. Rybalko, “Long-time asymptotics for solutions of the integrable nonlocal nonlinear Schrödinger equation”, Modern problems in mathematics. V.Karazin Kharkiv National University. Apr. 25–26, 2017
- Ya. Rybalko, “Initial value problem for the time-dependent linear Schrödinger equation with a point singular potential by the uniform transform method”, IV International conference. Analysis and mathematical physics. B. Verkin Inst. LTPE. Jun. 13–17, 2016

Beyond academia

- I worked part-time as a data scientist in the IT company Intego Group LLC from Aug. 2018 till May 2020, where I developed algorithms in topological data analysis using Python programming language.