Departments of Nanophysics of Condensed Media,
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Denis Sheka

Curriculum Vitæ

Personal

Professional title	Professor
Position	Professor
Date of birth	5th May, 1969
Place of birth	Kyiv, Ukraine
Sex	Male
Marital Status	Married, one child
Citizenship	Ukraine

Research area

- Curvilinear nanomagnetism
- Topological effects in nanomagnets
- Dynamics of magnetic soliton–like excitations: domain walls, vortices, skyrmions, Bloch points

Academic Degree and Theses

2009 **D. Sc. in Theoretical Physics**, *Bogolyubov Institute for Theoretical Physics*, Kyiv, Ukraine
D.Sc. thesis "Dynamics of two-dimensional magnetic solitons"

2005–2008 **Dr.Cand. (habilitation) in Theoretical Physics**, *Radiophysics Faculty, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

1996 **Cand. Sc. in Magnetism**, *Institute for Metal Physics*, Kyiv, Ukraine
Ph.D thesis "Vortices in Two–Dimensional Easy–Plane Magnets. Dynamics, Relaxation, and Contribution to the Magnet Response Functions"

Academic Ranks

2024 **Academician**, *Academy of Sciences of the Higher School of Ukraine*

2014 **Full professor**, *National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

2002 **Associate professor**, *National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

Education

1991–1995 **PhD Student in Physics**, *Radiophysics Faculty, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

1991 **M. Sc. in Physics**, *Department of Crio- and Micro- electronics, Radiophysics Faculty, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine
M.Sc thesis "Dynamics of Two–Dimensional Solitons (Magnetic Vortices) and Their Contribution to the Thermodynamics of Layered Magnets"

1986–1991 **Undergraduate Student in Physics**, *Radiophysics Faculty, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

Employment

2023–present **Professor**, *Department of Nanophysics of Condensed Media, Educational Scientific Institute of High Technologies, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

2013–2023 **Professor**, *Department of Mathematics and Theoretical Radiophysics, Faculty of Radio Physics, Electronics and Computer Systems, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

2008–2012 **Associate Professor**, *Department of Mathematics and Theoretical Radiophysics, Faculty of Radio Physics, Electronics and Computer Systems, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

2006–2007 **Humboldt Fellow**, *Bayreuth University*, Bayreuth, Germany

2000–2005 **Associate Professor**, *Department of Mathematics and Theoretical Radiophysics, Faculty of Radio Physics, Electronics and Computer Systems, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

1994–2000 **Assistant Professor**, *Department of Mathematics and Theoretical Radiophysics, Faculty of Radio Physics, Electronics and Computer Systems, National Taras Shevchenko University of Kyiv*, Kyiv, Ukraine

Professional Activities

Invited Position

2024–2025 **Non-Resident Academic Associate**, *Virginia Commonwealth University and the Davis Center at Harvard University*, USA

Part–time Position

2010–2013 **Professor (partial time)**, *Institute of High Technologies, Kyiv University*, Kyiv, Ukraine

2009–2010 **Senior Research Fellow (half time)**, *Bogolyubov Institute for Theoretical Physics*, Kyiv, Ukraine

Long–Time Commitments

2013–2023 **Scientific Secretary**, *Coordinating Council of the Complex Scientific Programme "Modern Technologies and Matherials", Kyiv University*, Kyiv, Ukraine

2004–2005 **Acting as the Deputy Dean (Scientific Affairs)**, *Radiophysics Faculty, Kyiv University*, Kyiv, Ukraine

2000–2004 **Scientific Secretary**, *Department of Mathematics and Theoretical Radiophysics, Radiophysics Faculty, Kyiv University*, Kyiv, Ukraine

Visits for Joint Research

HZDR Dresden, Germany **Group of Dr. D. Makarov**, *Jan-Feb 16; Jan-Feb 17, Jul-Aug 17, Feb 18, Jul-Aug 18, Jan-Feb 19, Jul-Aug 19, Dec 19-Jan 20, Jul 21, Nov 21, Jan 26, Jun-Jul 26*

Kiel University, Germany **Group of Prof. J. McCord**, *Jul 21*

Universidad Técnica Federico Santa María, Valparaíso, Chile **Group of Prof. P. Landeros**, *Mar-Apr 17, Jan 18*

University of Seville, Spain **Group of Prof. N. Quintero**, *Jun 17*

Bristol University, GB **Group of Prof. J. Robbins**, *Feb 15; Sep 16*

Los Alamos National Laboratory, USA **Group of Prof. A. Saxena**, *May 16*

University of Bayreuth, Germany **Group of Prof. F. Mertens**, *Nov 99-Jan 00; May-Jun 00; Nov-Dec 01; Nov-Dec 02; Jul-Sep 03; Jan-Feb 04; Jul 04; Jan-Feb 05; Jun 05; Jan 06-Aug 07; Jan-Feb 08; Jul 09; Feb 10; Jul-Aug 10; Jun-Aug 12; Jul-Aug15*

IFW Dresden, Germany — **Group of Dr. D. Makarov**, *Jun 11; Jun 12; Sep-Oct 13; Jan-Feb 15*

MPI Stuttgart, Germany — **Group of Dr. H. Stoll**, *Jan 07; Jan-Feb 09*

INSA de Rouen, France — **Group of Dr. J.-G. Caputo**, *Nov 04; Jun 05; May 06; Jan-Feb 08*

Bose Centre, Kolkata, India — **Group of Prof. A. Mookerjee**, *Dec 04*

Languages

Ukrainian	Fluent	*Native language*
Russian	Fluent	*Mother tongue*
English	Fluent	

Memberships

- Ukrainian Physical Society
- American Physical Society
- American Chemical Society
- IEEE Magnetic Society

Activity as a Referee

Review services for Foundations/ Research Commissions — National Science Foundation (NSF, USA), Deutscher Akademischer Austauschdienst (DAAD, Germany), Research Foundation Flanders (FWO, Belgium), Fondo Nacional de Desarrollo Científico y Tecnológico (FONDECYT, Chile), National Research Foundation of Ukraine, Ukrainian State Agency for Science, Innovation and Informatization (Ukraine), Scientific Council of Ministry of Education and Science (Ukraine), Research Commission of ETH Zurich (Switzerland)

Referee for Journals — Nature Nanotechnology, Nature Physics, ACS Nano, Nature Communications, Physical Review Letters, Materials Research Letters, SciPost Physics, Physical Review Applied, NPG Scientific Reports, Results in Physics, Physical Review B, New Journal of Physics, Nanotechnology, Journal of Magnetism and Magnetic Materials, Royal Society Open Science, Journal of Physics D, Physical Review E, Journal of Applied Physics, Journal of Physics A, Physica Status Solidi, Physics Letters A, IEEE Transactions on Magnetics, Low Temperature Physics, Ukrainian Journal of Physics

Referee for Academic Publishing — Elsevier

Recent Activities

2023 — **Minicolloquia "Curvilinear condensed matter"**, *Co-organizer*, Joint Conference of the Italian and European Community of Condensed Matter CMD30, Milan, Italy

2021 — **717 WE-Heraeus-Seminar "Curvilinear condensed matter: fundamentals and applications"**, *Co-organizer*, Online Seminar (MeetAnyway)

2019 — **Workshop "Curvilinear micromagnetism"**, funded by Alexander-von-Humboldt Foundation, *Co-organizer*, Kyiv, Ukraine

Awards, grants, etc.

2024–2028 — **COST Action**, *Topological textures in condensed matter (Polytopo) CA23134*

2025–2027 — **Research Project No. 2025.07/0237**, *National Research Foundation of Ukraine*, Ukraine

2025–2026 — **Research Grant No. 9918**, *IEEE Magnetics Society and the Science and Technology Center of Ukraine*

2023–2024 — **Senior Fellowship**, *Virtual Ukraine Institute for Advanced Study (VUIAS)*

2023 — **Grant**, *Program "Universities for Ukraine (U4U) Non-Residential Fellowship Program"*

2022–2023 **Research Grant No. 9918**, *IEEE Magnetics Society and the Science and Technology Center of Ukraine*

2020–2025 **Joined German-Ukrainian project ID MC 9/22-1**, *grant from DFG*, Germany

2019–2021 **Research Project No. 19BF052-01**, *Taras Shevchenko National University of Kyiv*, Kyiv, Ukraine

2017–2021 **Joined German-Ukrainian project Reserach Group Linkage Programme**, *Alexander von Humboldt Foundation, Helmholtz-Zentrum Dresden-Rossendorf*, Dresden, Germany

2018–2019 **Joined German-Ukrainian project ID 57430566**, *grant from DAAD Leonhard Euler Programm*, Germany

2016–2017 **Joined German-Ukrainian project ID 57290665**, *grant from DAAD Leonhard Euler Programm*, Germany

2015 **Renewal Grant**, *Alexander von Humboldt Foundation*, Bayreuth University, Bayreuth, Germany

2013 **Joined German-Ukrainian project ID MA 5144/3-1**, *grant from DFG*, Germany

2012 **Renewal Grant**, *Alexander von Humboldt Foundation*, Bayreuth University, Bayreuth, Germany

2011–2012 **Research Grant of the President of Ukraine F35/528**, *State fund for fundamental researches*, Kyiv, Ukraine

2007–2009 **Research Grant F25.2/081**, *State fund for fundamental researches*, Kyiv, Ukraine, Principle Investigator

2010 **Renewal Grant**, *Alexander von Humboldt Foundation*, Bayreuth University, Bayreuth, Germany

2006–2007 **Research Grant**, *Alexander von Humboldt Foundation*, Bayreuth University, Bayreuth, Germany

2005 **Davydov Prize**, *National Academy of Science of Ukraine*, Ukraine

1998 **Soros Grant for Young Teaching Scientists**, Ukraine

1995 **Soros Postgraduate Student Grant**, Ukraine

Key Research Achievements

in Quantum Mechanics
- **Extension of the Levinson Theorem** for the Aharonov-Bohm scattering; this found numerous applications in magnetism for scattering of magnons by 2D solitons, vortices, skyrmions.

in Field Theory
- **Generalization of the field-momentum equation** for a classical field with a singularity: in addition to the regular force, there appears the singular one. The collective-variable Lagrangian description is proposed for gyroscopical systems taking into account singularities with applications for magnetic solitons.

in Theory of Magnetism
- **Exact analytical solution** of the soliton-magnon scattering was found for the isotropic 2D magnets;
- **Prediction of truly local magnon modes** for the 2D skyrmion in ferromagnets; the resonance mechanism of the skyrmion dynamics was proposed;
- **Extension of the soliton phenomenology** for the 2D systems with application to magnetic solitons;
- **New intermediate vortex state** is predicted for ferromagnetic nanorings;
- **A method of fast switching the vortex chirality** in a magnetic nanodisk by applying a field pulse is proposed.
- **Prediction of ultrafast magnetic vortex switching by spin-polarized currents** in magnetic nanopillars;
- **New chaotic regime of a vortex core reversal** by a resonant perpendicular magnetic field;
- **A mechanism of dynamical formation of vortex-antivortex crystals** generated by spin-polarized current;
- **Development a fully 3D theory of curved magnets**, which gives a possibility to derive the energy for arbitrary curves and surfaces, and arbitrary magnetization vector fields; numerous applications for different curved nanowires, nanocaps, nanoshells, and curved nanofilms;
- **A new (geometrical) mechanism of the Dzyaloshinskii-Moriya interaction** is predicted with numerous applications to curved magnets.
- **A nonlocal chiral** symmetry breaking effect predicted for curved nanoshells

Teaching Activity

Lecture Courses
- Classical Electrodynamics (72 hours, general lecture course)
- Complex Analysis (36 hours, general lecture course)
- Mathematical Physics (36 hours, general lecture course)
- Differential Equations (36 hours, general lecture course)
- Introduction to the Physics of Solitons (16 hours, lecture course for Masters)
- Nanomagnetism (36 hours, lecture course for Masters)
- Physics of Magnetism (36 hours, lecture course for Masters)
- Modern Magnetism (54 hours, lecture course for Masters)
- Computer Modeling in Natural Sciences (20 hours, lecture course for Masters)

Seminars: Classical Mechanics, Electrodynamics, Quantum Mechanics, Statistical Physics, Mathematical Physics, Modern Magnetism, Electronic Transport of Meso- and Nanosystems

Educational publications: 8 publications, including 5 textbooks.

Profiles

Google Scholar: Number of citations $>$ 4900, **h-index 39**

Scopus: Scopus Author ID: 6701719591, Number of citations $>$ 3600, **h-index 36**
in top 100 most cited Ukrainian scientists in natural sciences and in top 5 in physics of magnetism

Web of Science: ResearcherID: F-3901-2012, Number of citations $>$ 3400, **h-index 37**

ORCID: ORCID ID: 0000-0001-7311-0639

Publications

$>$ **100** see *The list of publications*

- Books and book chapters: **6**
- Review and Perspective Journals Articles: **5**
- Research Journals Articles: **99**
- Patents: **1**