

# Albert Samoilenka

*Curriculum Vitae*

## PERSONAL DETAILS

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<i>Birth</i>	15.11.1994, Minsk, Belarus
<i>Nationality</i>	Belarus
<i>Address</i>	lane Dubravinski 5-18, Minks, Belarus, 220089
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## EDUCATION

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<b>Gymnasium 12</b> <i>Minsk, Belarus</i>	2001-2010
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<b>Gymnasium 29</b> <i>Minsk, Belarus</i>	2010-2012
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<b>Belarusian State University, The Faculty of Physics</b> <i>Minsk, Belarus, Graduated with summa cum laude</i> 5-year "Physicist" diploma (equivalent to Master degree)	2012-2017
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## WORK EXPERIENCE

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<b>Part time school physics teacher</b> <i>Gymnasium 29, Minsk, Belarus</i>	2012-2013
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Pupils preparation for International Physics Olympiad (Optional course)

<b>Part time physics teacher</b> <i>NCC "Zubrenok", Belarus</i>	Summer 2013
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Pupils preparation for Physics Olympiad

<b>One of the organizers of "SciFun" club at BSU</b> <i>Belarusian State University</i> Hobby	2016-present
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## SKILLS

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<i>Languages</i>	Russian (native) Belarusian (native) English (fluent)
<i>Software</i>	C++, C#, JavaScript, Unity3D, Delphi, Mathematica, L <sup>A</sup> T <sub>E</sub> X, FreeFem, Mayavi
<i>Systems</i>	LINUX, MS Windows, macOS, Android

## RESEARCH SUMMARY

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Main research area of my studies is related with Mathematical Physics, Numerical Methods in Field Theory, Topological Solitons and their applications in condensed matter physics and High energy physics. I have studied numerically and analytical various problems of Nonlinear Physics.

In 2015-2017 I studied gauged planar Skyrmions with and without Chern-Simons term (results were published in two papers in PRD [1, 2]), we showed that coupling to the magnetic field strongly affects the pattern of interaction between the constituents. Next, we constructed fractional Hopfions in Faddeev-Skyrme model and introduced new position curve for them (published in JHEP [3], conference proceedings [4]). Recently, we have found new class of regular soliton solutions of the gauged planar Skyrme model with fractional topological charges and finite energy – gauged merons, we also found a new relation between the quantization of the magnetic flux of the solitons and the Poincare index of scalar field (published in PRD [5]). Now we are finishing another work on Hopfions in gauged Faddeev-Skyrme model, where we have implement ideas from [5] to show that magnetic flux on position and linking curves becomes quantized. Another direction of my work is related with study of the gauged domain walls on a cylinder and construction of the bound for Hopfions in frustrated magnets. The above mentioned works were carried out under supervision of Prof. Dr. Jakov Shnir.

I want to highlight that apart from analytical studies, which were closely connected to the topology, all above mentioned works I studied numerically. Simulated annealing algorithm served as a basis for my algorithm of numerical minimization of the energy functional, which I wrote on C++. When considering different models I adapted my algorithm accordingly, so that now it can successfully find solutions in 1, 2 or 3 dimensional models with more than  $200^3$  grid points and 5 fields in the last case. Also I modified it so that it's possible to find saddle points for non-positively defined functionals. It was successfully used for 2-d baby Skyrmions, Hopfions and 3-d Skyrmions.

## AWARDS

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- First Prize of Special Funds of the President of the Republic of Belarus for XIX Republic Young Physicists' Tournament, 2011
- Second Prize of Special Funds of the President of the Republic of Belarus for XX Republic Young Physicists' Tournament, 2012
- Gold medal on Belarusian Physics Olympiad, Belarus, 2012
- **Gold medal on 43rd International Physics Olympiad (IPhO), Estonia 2012**
- First Prize of Special Funds of the President of the Republic of Belarus for 43rd IPhO with Delivery of the Breastplate of the Laureate
- **Enlisted in the fund of talented youth of Republic of Belarus, 2012**
- **Silver medal on 2nd World Physics Olympiad (WoPhO), Indonesia 2012**
- Gold medal on Xth International Engineering Mechanics Contest, Belarus, 2014
- Prize of Special Funds of the President of the Republic of Belarus for Xth International Engineering Mechanics Contest, 2014
- Silver medal on XIth International Engineering Mechanics Contest, Belarus 2015

- **2nd place on JINR Youth Prize Competition of The XX International Scientific Conference of Young Scientists and Specialists, Dubna 2016**
- 1st place in 3 Minute Thesis competition, Belarus-Ivanovo-Karaganda 2017
- 1st category on the Republican competition of scientific works of students, Minsk, Belarus, 2017.
- **Ministry of education grant at BSU, Minsk, 2018**

## **ATTENDED CONFERENCES, SCHOOLS AND PRACTICES**

- I participated in international physics Olympiads, namely: 43 IPhO, Estonia 2012 and 2 WoPhO, Indonesia 2012.
- Student Practice in JINR Fields of Research (3rd stage) Dubna, Russia, September 7 - 25, 2015
- Visit to Department of Physics at the School of Mathematics and Natural Sciences of the University of Oldenburg within the Ostpartnerschafts-Programme, 30. November - 7. December, 2016.
- Report on the XX International Scientific Conference of Young Scientists and Specialists, Dubna, 14-18 March, 2016
- The Helmholtz International School "Cosmology, Strings, New Physics" organized by the Bogoliubov Laboratory of Theoretical Physics, JINR, in the framework of the program DIAS-TH, Dubna, Russia, 28 August- 10 September, 2016
- 50-th Annual Winter School St.Petersburg Nuclear Physics Institute NRC KI 29 February – 5 March, 2016
- Poster on XXIV International Seminar Nonlinear Phenomena in Complex Systems, Joint Institute for Power and Nuclear Research - Sosny of the National Academy of Sciences of Belarus, Minsk, Belarus, May 16-19, 2017
- Report on SIG VI - Topological Solitons: from kinks to Skyrmions, the Institute of Physics, Jagiellonian University, Krakow, Poland, 19-22 June 2017
- Poster on V International School - Symmetry in Integrable systems and Nuclear Physics (SISNP-V), Yerevan State University, Tsakhkadzor, Armenia, July 16 - 22, 2017
- MITP Summer School 2017 - Joint Challenges for Cosmology and Colliders, The Mainz Institute for Theoretical Physics, Mainz, Germany, 6-25 August 2017
- Graduate program of the Research Training Group (RTG) 1523 "Quantum- and Gravitational Fields" at Theoretisch-Physikalisches Institut Astronomisch-Physikalische-Fakultat Friedrich-Schiller-Universitat Jena, Germany, January 10 - March 7, 2018.

## **PUBLICATIONS**

- [1] Samoilenska, A. Gauged multisoliton baby skyrmie model / A. Samoilenska, Ya. Shnir // Physical Review D. — 2016. — Vol. 93. — P. 065018. — [arXiv:1512.06280](#).

- [2] Samoilenka, A. Gauged baby skyrmie model with a chern-simons term / A. Samoilenka, Ya. Shnir // Physical Review D. "— 2017. "— Feb. "— Vol. 95. "— P. 045002. "— `arXiv:1610.01300`.
- [3] Samoilenka, A. Fractional hopfions in the faddeev-skyrmie model with a symmetry breaking potential / A. Samoilenka, Ya. Shnir // Journal of High Energy Physics. "— 2017. "— Vol. 2017. "— P. 29. "— `arXiv:1707.06608`.
- [4] Samoilenka, A. Multisoliton solutions of models of the skyrmie family / A. Samoilenka // Conference materials, Collection of works of the 74th scientific conference of students and post-graduate students of the BSU. "— 2017.
- [5] Samoilenka, A. Gauged merons / A. Samoilenka, Ya. Shnir // Phys. Rev. D. "— 2018. "— Feb. "— Vol. 97. "— P. 045004. "— <https://link.aps.org/doi/10.1103/PhysRevD.97.045004>.