On cluster algebras and topological string theory

Semenyakin, M.

Curriculum Vitæ

I was born on 22th of May 1995 in Kryviy Rih, Ukraine. When I was five years old, our family moved to Kyiv, where I went to primary school. During my time in school we moved several times, so I have studied in the Kyiv, Moscow, Dnipro, and finished high school at the Kyiv Natural and Scientific Lyceum # 145, where I already started working on simple scientific projects under the supervision of my teachers D. Basov and O. Trylis.

Since the 10th grade of high school I have started attending extra curricular classes at the Bogolyubov Institute for Theoretical Physics organized by Dr. V. Shadura and Dr. N. Iorgov. When I finished high school in 2012, I entered the physics department of Taras Shevchenko National University of Kyiv. I did my bachelor project under the supervision of Dr. O. Gamayun, who was a postdoctoral scientist at Leiden University at that time. The project was related to the splitting of the solitons under a quench.

After finishing my bachelor's, in 2016, I entered the master program in theoretical physics at Taras Shevchenko National University of Kyiv and also the joint program in mathematical physics of Skoltech and Higher School of Economics at Moscow, Russia. I have done my master thesis in physics under the supervision of Prof. Dr. G. Falkovich from the Weizmann Institute, Israel. It was related to the phenomenology of hydrodynamic flows of electrons in graphene. My master thesis in mathematics was done under the supervision of Prof. Dr. A. Marshakov, who worked at Skoltech and HSE, and was related to cluster integrable systems.

In 2018 I successively finished both master programs, and continued working on the relations between cluster algebras, string theory, and integrable systems as a PhD student under the supervision of Prof. Dr. A. Marshakov. The core of this thesis is made from research done in this period. In February 2022 I left Moscow because of the war Russia forced on Ukraine. I moved to the Lorentz Institute at Leiden University, where

I finished my PhD thesis in the group of Prof. Dr. C. W. J. Beenakker.

Starting from the times of my bachelor studies I have been actively involved in the organization of outreach, scientific schools, competitions, and conducting formal and informal courses for both high school and university students.

After finishing my PhD I am invited to work at the Perimeter Institute in Canada for the next three years.

List of Publications

[1] *Topological string amplitudes and Seiberg-Witten prepotentials from the counting of dimers in transverse flux*,
M. Semenyakin, arXiv: 2206.02162 [Chapter 4].

[2] *A brief introduction to quantum groups*,
P. Etingof, M. Semenyakin, arXiv: 2106.05252.

[3] *Solution of tetrahedron equation and cluster algebras*,
P. Gavrylenko, M. Semenyakin, Y. Zenkevich, *J. High Energ. Phys.* 2021, **103** (2021) [Chapter 3].

[4] *Cluster integrable systems and spin chains*,
A. Marshakov, M. Semenyakin, *J. High Energ. Phys.* 2019, **100** (2019) [Chapter 2].

[5] *Alternating currents and shear waves in viscous electronics*,
M. Semenyakin, G. Falkovich, *Phys. Rev. B* **97**, 085127 (2018) [Chapter 5].

[6] *Comment on 'Linking Spatial Distributions of Potential and Current in Viscous Electronics'*,
M. Semenyakin, arXiv:1609.05316

[7] *Soliton splitting in quenched classical integrable systems*,
O. Gamayun, M. Semenyakin, *J. Phys. A: Math. Theor.* **49** 335201 (2016)

[8] *On diagrammatic technique for nonlinear dynamical systems*,
M. Semenyakin, *Mod. Phys. Lett. A*, Vol. **29**, No. **35**, (2014)