Luttinger liquid on a lattice

Zakharov, V.

Curriculum Vitæ

I was born on the 11th of August in Saint Petersburg, Russia, where I spent my entire childhood and adolescence, and first emerged as an independent adult. During that time, I studied and successfully graduated from Physics and Mathematics Lyceum №366, completing my general education there between 2004 and 2015. I fell in love with physics when I was first introduced to it in the 7th grade by my teacher Aleksey V. Stepanov. My passion for it remained strong throughout my school years. I participated in several physics competitions, reaching the regional finals as my highest achievement. Driven by my dream of becoming a physicist, I passed the national exam in physics with the highest possible grade, which allowed me to be successfully admitted to Saint Petersburg Academic University in 2015.

At Academic University, I enrolled in a novel bachelor's program in physics that had been launched just a year prior to my admission. The program was designed for a small amount of 30 students and was taught by highly professional researchers from various academic institutions in Saint Petersburg. I chose to specialise in theoretical physics and applied for a bachelor's thesis project in the Sector of Theory of Quantum Coherent Phenomena in Solids at the Ioffe Institute. After passing the admission exams to join the group, I began working under the supervision of Alexander N. Poddubny, which led to my first scientific publication two years later. I graduated from Academic University in 2019 with honors (cum laude). Unfortunately, shortly after my graduation, both the university in general and the bachelor's program in physics in particular collapsed and ceased to exist in their original form.

I continued my studies in theoretical physics at Skoltech, a newly established international technological university in Moscow. After passing the admission exams, I was accepted into the Theoretical Physics program, curated by researchers from the Department of Quantum Microscopic Theory at the Landau Institute. At Skoltech, I further advanced my technical skills in theoretical physics and continued the research work. I completed my Master's thesis under the supervision of Igor S. Burmistrov and graduated in 2021 cum laude. Sadly, a year after my

graduation, the Theoretical Physics program at Skoltech was closed.

Pursuing my goal of becoming a theoretical physicist, I obtained a Ph.D. position in 2021 in the group of Carlo Beenakker at the Lorentz Institute of Leiden University. During my Ph.D., I was given the freedom of working on topics and participating in projects, that I found interesting. This allowed me to explore a few research directions and collaborate with several research groups, including Quantum Tinkerer at TU Delft, the Applied Quantum Algorithms (aQa) group at Leiden University, and the group of Frank Verstraete at Ghent University. I have participated in many schools and several conferences, continuously learning new aspects of theoretical physics and presenting my own work.

After finishing my Ph.D., I will stay in the group of Carlo Beenakker as a postdoctoral researcher, where I will continue working on topological and strongly correlated matter.

List of Publications

[1] V. A. Zakharov and A. N. Poddubny, *Transverse magneto-optical Kerr effect enhanced at the bound states in the continuum*, Physical Review A **101**, 043848 (2020).

[2] V. A. Zakharov and I. S. Burmistrov, *Residual bulk viscosity of a disordered two-dimensional electron gas*, Physical Review B **103**, 235305 (2021).

[3] V. A. Zakharov, A. M. Bozkurt, A. R. Akhmerov and D. O. Oriekhov, *Landau quantization near generalized Van Hove singularities: Magnetic breakdown and orbit networks*, Physical Review B **109**, L081103 (2024).
[Chapter 5 is based on this publication.]

[4] V. A. Zakharov, J. Tworzydło, C. W. J. Beenakker and M. J. Pacholski, Physical Review Letters **133**, 116501 (2024).
[Chapter 2 is based on this publication.]

[5] V. A. Zakharov, S. Polla, A. Donís Vela, P. Emonts, M. J. Pacholski, J. Tworzydło, and C. W. J. Beenakker, *Luttinger liquid tensor network: Sine versus tangent dispersion of massless Dirac fermions* Physical Review Research **6**, 043059 (2024).
[Chapter 3 is based on this publication.]

[6] V. A. Zakharov, I. C. Fulga, G. Lemut, J. Tworzydło, C. W. J. Beenakker, *Majorana-metal transition in a disordered superconductor: percolation in a landscape of topological domain walls* , New Journal of Physics **27**, 033002 (2025).
[Chapter 4 is based on this publication.]

[7] C. W. J. Beenakker and V. A. Zakharov, *Bimodal distribution of delay times and splitting of the zero-bias conductance peak in a double-barrier normal-superconductor junction*, arXiv:2506.18515 (2025).