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Gibbs states in statistical mechanics and dynamical systems

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Curriculum Vitae

Mirmukhsin Utkirbek ugli Makhmudov was born in Khorazm, Uzbekistan. He completed his primary education at a local village school in 2011 and then attended a local high school in Urganch, graduating in 2014.

After achieving a high score in the national university entrance exam, Mirmukhsin was awarded a full government scholarship to study in the Department of Mathematics at the National University of Uzbekistan (NUUz). During his undergraduate studies, he distinguished himself by winning several national and international mathematics competitions, including the 2nd Qori Niyoziy National Mathematics Competition and the 5th North Countries Universities Mathematical Competition. In 2018, he graduated with honours from the mathematics department. That same year, he earned the highest score in the department's master's entrance exam, securing a full scholarship for the master's program at NUUz.

Alongside his master's studies at NUUz, Mirmukhsin was offered a position at the Monetary Policy Department of the Central Bank of Uzbekistan as a first-category economist. His career at the CBU progressed in parallel with his academic work, and he was promoted twice – first to the lead economist and then to the chief economist role.

In 2020, Mirmukhsin completed his master's degree, writing a thesis under the supervision of Professor Rasul G'anixo'jaev on the topic "Small parametric dynamical systems", which resulted in a single-authored publication. That same year, he was awarded a Postgraduate Diploma Fellowship by the International Centre for Theoretical Physics (ICTP) in Trieste, Italy. He spent a year in the Mathematics section at ICTP, where he completed a diploma thesis under the supervision of Professor Stefano Luzzatto, focusing on the properties of topological pressure and its relation to invariant measures.

In September 2021, following his time at ICTP, Mirmukhsin was admitted to the PhD program at Leiden University. His research at Leiden focused on statistical mechanics, ergodic theory, and dynamical systems, with particular emphasis on thermodynamic formalism, the Dobrushin–Lanford–Ruelle (DLR) Gibbs formalism, and multifractal analysis. Throughout his PhD, Mirmukhsin presented his research at numerous national and international conferences, including the

Mark Kac Seminar, the 11th World Congress in Probability and Statistics, and the 9th European Congress of Mathematics. In addition to his research activities, he also assisted in teaching several university courses at Leiden.

Mirmukhsin's doctoral dissertation, "Gibbs States in Statistical Mechanics and Dynamical Systems" compiles results from five research projects, which also led to research papers listed below:

1. *The Eigenfunctions of the Transfer Operator for the Dyson model in a field*, J. Stat. Phys., 192(92), 2025, 1-20.
2. *Multifractal Formalism from Large Deviations*, 2024, joint with E. Verbitskiy and Q. Xiao
3. *On an extension of a theorem by Ruelle to long-range potentials*, 2024, joint with A. van Enter, R. Fernández and E. Verbitskiy
4. *Gibbs properties of equilibrium states*, 2025, joint with E. Verbitskiy
5. *Concentration inequalities and Transfer operators for supercritical Dyson models*, 2025.