Abstract of „Dynamics of One-Dimensional Integrable Systems”

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The thesis investigates the out-of-equilibrium dynamics of one-dimensional integrable quantum systems, a class of models known for possessing an extensive number of conserved quantities and exact solvability. It contributes to the theoretical foundations of Generalized Hydrodynamics (GHD) by rigorously establishing formulae for the mean values of current operators in the XXZ model, and more generally, in $U(1)$ symmetric models, as well as in the XYZ model. Additionally, it explores two specific 'simple' integrable models, the so-called folded XXZ model and a newly introduced anyon-like spin ladder model, both of which have particularly simple dynamics that makes them potential benchmarks for comparing GHD predictions against exact computations. The folded XXZ model also exhibits Hilbert space fragmentation – a unique mechanism of thermalization breaking leading to dynamically disconnected sectors in the spectrum and persistent oscillations, which are numerically investigated in the thesis.