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To whom it may concern.

This is a report on the Master thesis "Generalized multifractality in the spin quantum Hall symmetry class" by Serafim Babkin. The thesis contains two main parts, each based on a separate paper (one published, and one in preparation for publication).

In the first part, the author studies generalized multifractality of critical wave functions near boundaries of a two-dimensional system in the symmetry class C. Class C has been a fertile playground for studies of critical behavior of disordered electronic systems near Anderson transitions in two dimensions due to the existence of a mapping to classical percolation that allows to extract exact results for several critical exponents. The project reported in the thesis continues this line of inquiry.

One intriguing aspect of Anderson transitions is that unlike conventional critical points, they seem to obey scale invariance but not conformal invariance. The violation is seen in the functional form of multifractal spectra on the indices of the corresponding scaling observables. This issue is far from being settled, and the thesis contributes a very useful additional piece of relevant evidence by computing the generalized surface multifractality numerically in two different geometries: the half-plane and an infinite strip with open boundary conditions. The conformal mapping between the two geometries leads to a relation between multifractal spectra and the Lyapunov exponents in the quasi-1D geometry. This relation is checked in the thesis and seems to be satisfied with a good precision. On the other hand, the spectrum of multifractal exponents itself violates the generalized parabolicity, which would be true in a conformal field theory with local conformal invariance. This result is similar to previous results for bulk multifractal exponents.

In the second part of the thesis the author studies effects of interactions on the critical properties at the Anderson transition in class C in $2 + \varepsilon$ dimensions using the Finkelstein's sigma model. The renormalization group analysis is controlled by the small parameter ε. The main conclusion is that interactions affect multifractal exponents and violate symmetry properties present in a non-interacting system. The violation occurs already at one-loop order.

Overall, the thesis represents an important contribution to the body of knowledge on critical properties near Anderson metal-insulator transitions. The thesis is well written, and I recommend that the author is awarded a Master's degree.

Sincerely yours,

Ilya Gruzberg

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