ALPEN-ADRIA UNIVERSITÄT KLAGENFURT

INVITATION TO THE DOCTORAL SEMINAR

Local Limits of Uniform Spanning Trees via Kirchhoff's Effective Resistance Formula

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Wednesday, 29 April 2026 | 10:00–10:45

N.2.35

ABSTRACT

The objective of the talk is to give a brief introduction to certain aspects of electrical network theory via a nice application to uniform spanning trees.

Kirchhoff's effective resistance formula was discovered by Kirchhoff in 1847, but it remains a widely used tool in modern research. The formula states that, for any finite graph G, the probability of an edge appearing in the uniform spanning tree of G is equal to the effective resistance of that edge when we consider G as an electrical network. I will present the formula, briefly explain a proof, and illustrate its use in a recent proof by Nachmias and Peres (2022), which shows that the local limit of uniform spanning trees for a large class of graphs is the Poisson-distributed Bienaymé-Galton-Watson tree(1), conditioned to survive. Along the way, we will also see Wilson's algorithm, a commonly used algorithm for sampling uniform spanning trees. Time permitting, I may also discuss some recent extensions obtained in my own research.

We hope to see you there!

