Spectral geometry and zeta-functions: analysis on graphs and fractals.

Spectral geometry studies relations between geometric properties of domains, manifolds, or graphs and spectral properties of the corresponding differential operators [1]. Recent progress in spectral analysis of finite metric graphs lead to remarkable break-through in Fourier analysis and explicit construction of so-called crystalline measures [2]. Different areas of mathematical analysis and algebra interplay with each other in a non-trivial way leading to new unexpected results lying far away from the origin of our research – spectral theory of differential operators on metric graphs. Research in this area shows that mathematics is united, also the emphasis is always lying within mathematical analysis, in particular spectral theory.

It is time to go further and study spectral properties of infinite graphs, in particular fractals which we understand as self-similar metric graphs. Most probably the associated zeta-functions are going to play a very important role in these studies. As a starting point one should better understand connections between symmetries of finite metric graphs and their spectra.

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[1] Pavel Kurasov, *Spectral geometry of graphs*: *to appear*, 2023.

[2] P. Kurasov and P. Sarnak, *Stable polynomials and crystalline measures*, J. Math. Phys. **61** (2020), no. 8, 083501, 13, DOI 10.1063/5.0012286. MR4129870