Infinite Quantum Graphs

In the last decades, the study of quantum graphs (Laplacians on metric graphs) has become a popular subject with various applications in physics and biology. The spectral properties of the Laplacian are crucial in understanding the heat equation and the Schrödinger equation on metric graphs. Whereas for finite metric graphs the Laplacian is (essentially) self-adjoint and has discrete spectrum, the behavior of Laplacians on infinite graphs is much less understood.

In this talk, we will discuss basic spectral properties of infinite quantum graphs (self-adjointness, invertibility, discreteness of the spectrum,...). Our main focus lies on recently discovered connections to discrete (weighted) Laplacians on infinite graphs.

Based on joint work with Aleksey Kostenko (Ljubljana&Vienna) and Mark Malamud (Moscow).