Laplacians on infinite graphs

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There are two different notions of a Laplacian operator associated with graphs: discrete graph Laplacians and continuous Laplacians on metric graphs (widely known as quantum graphs). Both objects have a venerable history as they are related to several diverse branches of mathematics and mathematical physics.

The existing literature usually treats these two Laplacian operators separately. In this talk, I will focus on the relationship between them (spectral, parabolic and geometric properties). One of our main conceptual messages is that these two settings should be regarded as complementary (rather than opposite) and exactly their interplay leads to important further insight on both sides.

Based on joint work with Noema Nicolussi.