Long time behavior of the solutions for some diffusion processes on a metric graph

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In this talk we present some recent result about the long time behavior of the solutions for some diffusion processes on a metric graph.

We study local and nonlocal (convolution type problems with an integrable kernel) evolution problems on a metric connected finite graph in which some of the edges have infinity length. We show that the asymptotic behaviour of the solutions is given by the solution of the heat equation, but on a star shaped graph in which there is only one node and as many infinite edges as in the original graph. In this way we obtain that the compact component that consists in all the vertices and all the edges of finite length can be reduced to a single point when looking at the asymptotic behaviour of the solutions. We prove that when time is large the solution behaves like a gaussian profile on the infinite edges.

This is a joint work with Julio D. Rossi (Buenos Aires) and Angel San Antolin (Alicante).