SOE 7: Innovation Dynamics on Networks (Invited Talk Ernesto Estrada)

Time: Tuesday 9:30–10:15   Location: GÖR 226

Invited Talk   SOE 7.1   Tue 9:30   GÖR 226
Diffusion of Innovations under Direct and Indirect Peers Pressure — ●Ernesto Estrada — Dept. of Mathematics and Statistics, U Strathclyde, Scotland

How do innovations diffuse on a graph of agents? - I will start by a short introduction to the problem of diffusion on graphs, defining the graph Laplacian and some applications in areas ranging from autonomous robots to diffusion of innovations. Then, I will motivate the necessity of incorporating long-range interactions to account for certain physical diffusive processes. I will then introduce the k-path Laplacians as operators in l^2 Hilbert space and prove a few of their properties (boundedness, self-adjointnes). At this point I will introduce a generalisation of the diffusion equation on graphs by using Mellin- and Laplace-transformed k-path Laplacians. I will prove the existence of super-diffusive regimes for certain values of the parameter in the Mellin-transformed k-path Laplacian in one-dimension. Finally, I will introduce a multi-hopper model, that generalises the random walk model on graphs, by allowing non-nearest neighbours jumps. I will show the differences between this model and the random walk with Levy flights, which is valid only in the continuous space. I will prove that for certain asymptotic value of the parameters in the transforms of the k-path Laplacians, the multi-hopper reaches the minimum hitting and commute times in graphs of any topology. I will illustrate the results with the diffusion of innovations, such as a new teaching method among high schools and the adoption of a Biotech product among Brazilian farmers.