Invariance principle for symmetric Feller processes on trees

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Abstract:
Symmetric Feller processes on graph-like metric spaces can be associated with the resistance metric and a measure which plays the role of a time change. One would therefore expect that a sequence of symmetric Feller processes converges if the associated geometries converge. In this lecture we shall introduce with the Gromov-vague and Gromov-Hausdorff-vague topology two notions of convergence of metric measure spaces which allow to formalize the above statement with convergence of the finite-dimensional distributions respectively weak convergence in path space. We illuminate the main key steps in the proof. Thereby we establish a tightness criterion by closing the gap between the topologies. We will illustrate the strengths of the result by discussing examples including the convergence of random walks on the size-biased Galton-Watson tree towards the diffusion on the Kallenberg tree. In the end we discuss new developments for situations where the associated geometry is no longer graph-like, or equivalently, the notion of a resistance metric is no longer available.