A graph discretized approximation of diffusions with drift and killing on a complete Riemannian manifold

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In this talk, we present a graph discretized approximation scheme for diffusions with drift and killing on a complete Riemannian manifold M. More precisely, for given a Schrödinger operator with drift on M having the form $\mathcal{A} = -\Delta - b + V$, we introduce a family of discrete time random walks in the flow generated by the drift b with killing on a sequence of proximity graphs, which are constructed by partitions cutting M into small pieces. As a main result, we prove that the drifted Schrödinger semigroup $\{\mathrm{e}^{-t\mathcal{A}}\}_{t\geq 0}$ is approximated by discrete semigroups generated by the family of random walks with a suitable scale change. This result gives a finite dimensional *summation* approximation of a Feynman-Kac type functional integral over M. Furthermore, when M is compact, we also obtain a quantitative error estimate of the convergence.

This talk is based on a joint work with Satoshi Ishiwata (Yamagata University).