Formulas and estimates for heat kernels

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The understanding of probability measures (such as the Wiener measure) on the spaces of paths on a manifold benefitted from the combined efforts of generations of mathematicians, many of the most stochastic analysts came from Japan. It is perhaps appropriate to explain here our latest results, techniques that are new or old in new use, and problems. We work on non-compact manifolds, and hope also to touch on the topic of generalized Brownian bridges, and (real) Schrödinger equations.

Heat kernel and its logarithm are fundamental objects, leading to reference measures for Dirichlet forms and for Ornstein-Uhlenbeck operators on the path spaces. For these we would need Hessian estimates as well as gradient estimates.