Rare-event simulation and Hamilton-Jacobi equations

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In this talk I will discuss the design of efficient variance reduction techniques, such as importance sampling, multi-level splitting and interacting particles, for computing the probability of rare events by stochastic simulation. It has been demonstrated, by P. Dupuis, H. Wang and others, that the design problem is essentially equivalent to the construction of certain subsolutions to and associated partial differential equation of Hamilton-Jacobi type. I will present a general procedure for the construction of subsolutions, based on the Mane potential, that leads to efficient simulation algorithms.