A splitting Hamiltonian Monte Carlo method for efficient sampling

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Abstract: In this talk, I want to introduce a splitting Hamiltonian Monte Carlo (SHMC) algorithm, which can be computationally efficient when combined with the random mini-batch strategy. By splitting the potential energy into numerically nonstiff and stiff parts, one makes a proposal using the nonstiff part, followed by a Metropolis rejection step using the stiff part that is often easy to compute. The splitting allows efficient sampling from systems with singular potentials (or distributions with degenerate points) and/or with multiple potential barriers. We also use random batch strategies to reduce the computational cost in generating the proposals for problems arising from many-body systems and Bayesian inference, and estimate both the strong and the weak errors in the Hamiltonian induced by the random batch approximation.