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Minimal Autocorrelation in HMC simulations using Exact Fourier Acceleration

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Hybrid Monte Carlo (HMC) simulations often suffer from long autocorrelation times, severely reducing their efficiency. In this talk two of the main sources of autocorrelations are identified and eliminated. The first source is the sampling of the canonical momenta from a sub-optimal normal distribution, the second is a badly chosen trajectory length. Analytic solutions to both problems are presented and implemented in the exact Fourier acceleration (EFA) method. EFA completely removes autocorrelations for near-harmonic potentials and consistently yields (close-to-) optimal results for numerical simulations of various physical systems. Some examples will be presented.

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