Convergence of the kinetic annealing for general potentials

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The goal of a simulated annealing is to find, via a stochastic process, the minimum of some function $U : \mathbb{R}^d \mapsto \mathbb{R}_+$. To this end we study the process :

$$\begin{cases} dX_t = Y_t dt \\ dY_t = -\nabla U(X_t) dt - \gamma_t Y_t dt + \sqrt{2\gamma_t \beta_t^{-1}} dB_t , \end{cases}$$
(1)

where $\beta = \frac{\ln(e^{c\beta_0}+t)}{c}$. Let c^* be the largest energy barriere of U. We proved under mild assumptions on the potential U the convergence of the kinetic annealing towards the minimum of U for $c > c^*$, as well as the non-convergence for $c < c^*$.