

# To equilibrate or not to equilibrate that is the question

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Non-confining potentials are ubiquitous in nature, from the hydrogen atom to gravitational fields. In a thermal environment, the flatness of a potential prevents the system from reaching equilibrium and leads to a divergent partition function. For Brownian particles subject to a potential well that is asymptotically flat, when the temperature is small enough compared to the trap depth, there exists a range of timescales over which physical observables remain practically constant. This range can be very long, of the order of the Arrhenius factor. We show that, for these quasi-equilibrium states, the standard Boltzmann-Gibbs framework can still be applied, through proper regularization.