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Threshold for everlasting initial memory for rare events in equilibration processes JAE SUNG LEE, Korea Institute for Advanced Study, CHULAN KWON, Myoung-ji Unioversity, HYUNGGYU PARK, Korea Institute for Advanced Study — Conventional wisdom indicates that initial memory should decay away exponentially in time for general (noncritical) equilibration processes. In particular, time-integrated quantities such as heat are presumed to lose initial memory in a sufficiently long-time limit. However, we show that the large deviation function of time-integrated quantities may exhibit initial memory effect even in the infinite-time limit, if the system is initially prepared sufficiently far away from equilibrium. For a Brownian particle dynamics, as an example, we found a sharp finite threshold rigorously, beyond which the corresponding large deviation function contains everlasting initial memory. The physical origin for this phenomenon is explored with an intuitive argument and also from a toy model analysis.

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