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Average conditional return times to rare events in billiard models

Abstract:
Motivated by the study of transport processes in some classes of billiard models, we wish to characterize a limiting regime of higher-dimensional billiards such that interaction between some of their degrees of freedom occurs only rarely while others mix fast. Under such conditions, the dynamics of the slow degrees of freedom can be approximated by a stochastic process with exponentially distributed waiting times. These times correspond to the times separating interactions among the slow degrees of freedom and we propose to call them conditional return times. The definition extends beyond the rare interaction regime and some universal formulas apply.