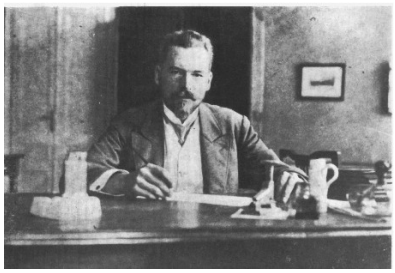

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Unified Approach to Gated Reactions on Networks

Wednesday, 29 September 2021 09:30 (20 minutes)

For two molecules to react they first have to meet. Yet, reaction times are rarely on par with the first passage times that govern such molecular encounters. A prime reason for this discrepancy is stochastic transitions between reactive and nonreactive molecular states, which results in effective gating of product formation and altered reaction kinetics. To better understand this phenomenon we develop a unifying approach to gated reactions on networks. We first show that the mean and distribution of the gated reaction time can always be expressed in terms of ungated first-passage and return times. This relation between gated and ungated kinetics is then explored to reveal universal features of gated reactions. The latter are exemplified using a diverse set of case studies which are also used to expose the exotic kinetics that arises due to molecular gating.

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