Entropy Ratchet

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We propose a three-dimensional tube model consisting of a sequence of connected two-gate blobs for an ion channel and a microtube of a molecular motor. Due to the competition effect between two gates on the same blob surfaces, these two gates owing to gate modulation select the escape pathway for the Brownian particle inside a blob. Furthermore, there exists a nonzero net flow inside the 3-D tube and this unidirectional flow is strongly dependent on the selectivity of the escape pathway for the Brownian particle inside each individual blob. In this context, the Brownian particle moves uni-directionally without any applied external fluctuation forces and the entire process is entropy driven.