

Cooperative Behavior of Molecular Motors

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Abstract

All directed movements of living organisms are based on molecular machines which perform mechanical work on the nanometer scale. This article reviews recent work on molecular motors which bind to cytoskeletal filaments and walk along these filaments in a directed fashion; for a review, see [1]. Several systems and processes arising from the interplay of these motors and filaments will be discussed: dilute systems in which one can study the movement of single motor molecules along ordered [2] and disordered [3] filament tracks; ‘motor walks’ consisting of many diffusional encounters between motor and filament [4]; transport of cargo particles by several motors that can cover macroscopic distances and may exhibit bi-directional movement [5]; active diffusion along substrate surfaces with immobilized filaments [6]; and systems with many interacting motors that exhibit traffic jams, self-organized density and current patterns [4, 7], and phase transitions far from equilibrium [8].

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