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A Monte Carlo study of some non-equilibrium driven models and their contribution to the understanding of molecular motors IRINA MAZILU, MARK ALLEN, CHRISTOPHER GAITERI, Washington and Lee University — From the point of view of a physicist, a bio-molecular motor represents an interesting non-equilibrium system and it is directly amenable to an analysis using standard methods of non-equilibrium statistical physics. We conduct a rigorous Monte Carlo study of three different driven lattice gas models that retain the basic behavior of three types of cytoskeletal molecular motors. Our models incorporate novel features such as realistic dynamics rules and complex motor-motor interactions. We are interested in gaining a deeper understanding of how various parameters influence the macroscopic behavior of these systems. We answer the following questions: Does the system undergo a phase transition? If so, what are the parameters that determine this phase transition? What is the density profile of the system and what are the particle currents in the system? What is their dependence on various types of rates? How is the system behavior influenced by boundary conditions?

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