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Dynamic Phase Transitions in Coupled Motor Proteins ANATOLY KOLOMEISKY, EUGENE STUKALIN, Rice University — The effect of interactions on dynamics of coupled motor proteins is investigated theoretically. A simple stochastic discrete model, that allows to calculate explicitly the dynamic properties of the system, is developed. It is shown that there are two dynamic regimes, depending on the interaction between the particles. For strong interactions the motor proteins move as one tight cluster, while for weak interactions there is no correlation in the motion of the proteins, and the particle separation increases steadily with time. The boundary between two dynamic phases is specified by a critical interaction that has a non-zero value only for the coupling of the asymmetric motor proteins, and it depends on the temperature and the transitions rates. At the critical interaction there is a change in a slope for the mean velocities and a discontinuity in the dispersions of the motor proteins as a function of the interaction energy.

Anatoly Kolomeisky
Rice University

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