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Coarse-grained model for motor proteins interacting with single chain molecules MARAL ADELI KOUDEHI, NABINA PAUDYAL, JUTTA LUETTMER-STRATHMANN, University of Akron, Department of Physics — Motor proteins play an important role in many biological processes. One class of such molecules facilitates the translocation of biological chain molecules through membranes. The activity of motor proteins is also responsible for the unique mechanical properties of active matter. Since modified forms of membrane motors are active in vitro and their binding to single chains leads to the formation of loops that affect the chain's mechanical response, single-chain motor complexes are interesting model systems for active matter. In this work, we develop a simple coarse-grained model for a motor protein on a bead-spring substrate under tension. In our model, different pair potentials describe interactions between substrate and motor, motor components and substrate components. The movement of motor proteins entails ATP hydrolysis, which is modeled in terms of mechano-chemical states that couple positional and chemical degrees of freedom. We apply the model to the problem of cargo transport under confinement and the effect of motor-protein activity on the mechanical response of a single chain molecule.

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