Abstract Submitted
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Mechanics of short rod-like molecules in tension PRASHANT PUROHIT, University of Pennsylvania — Rod like macromolecules such as actin, DNA etc., are most commonly stretched using optical tweezers or fluid flow. In this presentation we will describe the mechanics of short rod like molecules in tension. The mechanics is dominated by the competition between tensile forces (exerted by fluid flow, or by a device, such as, optical tweezers) and the thermal fluctuations of the molecule. For molecules whose contour length is comparable to the persistence length we show that the boundary conditions play major role in determining the mechanical behavior. We use the equipartition theorem of statistical mechanics to obtain expressions for the amplitude of the transverse fluctuations of the molecule and its force-extension relation for various boundary conditions. We then apply our theory to an experiment on short fluctuating actin filaments trapped by various means. We estimate the tension in these filaments by fitting our theory to the measured values of transverse fluctuations as a function of the position along the filament.

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