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Noise Induced Regulation of DNA Loops JOSHUA MILSTEIN, YIH-FAN CHEN, JENS-CHRISTIAN MEINERS, University of Michigan, Ann Arbor — Protein-mediated DNA loop formation arises from thermal fluctuations within a crowded and active intracellular environment. Constant forces, on the order of Femtonewtons, have been shown to modulate the rate of loop formation, which suggests that tension may act to regulate genetic transcription. To understand how such a mechanism might operate within the cellular environment, we have been exploring the effects of a fluctuating force on the formation and dissociation rates of LacI-mediated DNA loops. Employing axial constant-force optical tweezers, we apply white noise Gaussian fluctuations, of varying widths and at different mean applied forces, to a length of dsDNA containing two *lac* binding sites while observing the looping dynamics. Our empirical observations, in conjunction with a stochastic model of the loop formation process, suggest that applying a varying level of tension to the DNA may, in fact, be a robust method for regulating transcription.

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