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**Cellular Tug-of-War: Forces at Work and DNA Stretching in Mitosis** BRIAN GRIFFIN, MARIA L. KILFOIL, University of Massachusetts - Amherst — In the microscopic world of the cell dominated by thermal noise, a cell must be able to successfully segregate its DNA with high fidelity in order to pass its genetic information on to its progeny. In this process of mitosis in eukaryotes, driving forces act on the cytoskeleton-based architecture called the mitotic spindle to promote this division. Our preliminary data demonstrates that the dynamics of this process in yeast cells is universal. Moreover, the dynamics suggest an increasing load as the chromosomes are pulled apart. To investigate this, we use three-dimensional imaging to track the dynamics of the poles of this architecture and the points of attachment to chromosomes simultaneously and with high spatial resolution. We analyze the relative motions of chromosomes as they are organized before segregation and as they are pulled apart, using this data to investigate the force-response behavior of this cytoskeleton-chromosome polymer system.

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