

## **Abstract**

Polymer physics relates the behavior of macroscopic materials to the dynamics of microscopic chain molecules. Experiments with single molecules can bridge the gap between bulk measurements and the statistical behavior of individual polymers. DNA, removed from its biological role, serves as a model system for studying the physics of single polymers, an area of investigation which in turn promotes the development of new genetic sequencing technologies and a better understanding of genomic organization in the cell. I will discuss my work over the past several years studying the physics of polymers with complex molecular topology. These include knotted DNA molecules, which serve as a model to study polymer entanglement, as well as membrane-like catenated (linked-ring) structures called kinetoplasts which can be described as "molecular chain-mail."