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Stretching, Twisting, and Unzipping DNA

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DNA mechanics governs many essential cellular processes. During DNA replication, repair, recombination, and transcription, often a DNA double helix is unwound, its two strands are separated to expose the base sequence, and compensatory supercoils are generated in the remaining DNA. Our lab develops new single molecule optical trapping techniques to probe the mechanics of DNA as it is stretched, twisted, and unzipped. These approaches reveal interesting physical properties as well as permit direct investigation of the mechanisms of enzymes involved in these processes. I will discuss our recent work in these directions.