

DNA in Tight Spaces

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Friday, September 11, 2026, 3:30pm

PH 112

Abstract: After water and oxygen, DNA is arguably the most famous molecule of life. This is not surprising, as the eye-catching double helix of DNA carries the instructions necessary to manufacture and assemble all the components of a living organism. However, the wealth of information encoded in DNA often overshadows its unusual physical properties, such as same-charge attraction.

In this lecture, I will describe my lab's efforts to characterize the physical properties of DNA through high-end computer simulations and elucidate their effect on DNA's biological function. The topics to be covered include nanopore sequencing of DNA, DNA electromotors, and genome packaging in viruses and human nuclei.

The lecture will illustrate how high-end computer simulations can reveal information inaccessible to current experimental probes and provide a forward-looking perspective on modeling an entire biological cell at all-atom resolution.