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The Anti-Brownian Electrokinetic Trap (ABEL trap)[1]

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The Anti-Brownian Electrokinetic Trap (ABEL trap) provides a means to trap and manipulate individual nanoscale objects in solution. The ABEL trap works by monitoring the Brownian motion of a single fluorescent particle of interest, and then applying a feedback electric field to the solution so that the resulting electrokinetic drift exactly cancels this Brownian motion. The ABEL trap can trap objects far smaller than can be trapped by laser tweezers. I will describe experiments on individual trapped molecules of fluorescently labeled λ-DNA. Due to its non-perturbative nature, the ABEL trap allows us to perform the first detailed studies of the conformation of individual DNA molecules in their equilibrium, unstretched state. We find that each molecule has a spectrum of conformational modes, and we experimentally determine the transition rates between modes. We compare the data to Rouse and Zimm models of polymer dynamics.

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