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Imaging the Dynamics of Individual Viruses in Solution[1] AARON GOLDFAIN, REES GARMANN, YOAV LAHINI, Harvard University, John A. Paulson School of Engineering and Applied Sciences, VINOTHAN MANOHARAN, Harvard University, John A. Paulson School of Engineering and Applied Sciences and the Department of Physics — We have developed optical microscopy techniques that can detect and track individual, unlabeled viruses at thousands of frames per second. We use these techniques to study fast, dynamic processes in the life cycles of bacteriophages (viruses that infect bacteria). I will describe experiments that capture the ejection of double stranded DNA from bacteriophage λ. During the 1-2 second ejection, the DNA genome transitions from a compact, highly ordered spool within the capsid into an extended random coil in solution. By quantifying the amount of light scattered from a single λ phage as its DNA ejects, we measure the amount of DNA remaining in the virus capsid as a function of time. Measuring small fluctuations in the rate of ejection may uncover clues about the complex conformational rearrangements that the DNA undergoes while escaping the capsid.

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