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Kinetic Accessibility of Buried DNA Sites in Nucleosomes WOLFRAM MÖBIUS, RICHARD A. NEHER, Arnold Sommerfeld Center for Theoretical Physics (ASC) and Center for Nanoscience (CeNS), LMU Munich, ULRICH GERLAND, Institute for Theoretical Physics, University of Cologne — Motivated by recent experiments on nucleosome accessibility [1,2] we study the transient exposure of protein-binding DNA sites within nucleosomes using a theoretical model for spontaneous partial DNA unwrapping from histones. We focus on the functional dependence of the rates for site exposure and re-burial on the site position, which is pertinent to gene regulation. We find the dependence to be roughly described by a random walker model. Close inspection however reveals a surprising dependence of the re-burial rates on the length of unwrapped DNA. We show that this corresponds to a physical effect of flexibility-assisted barrier crossing, which we characterize within a toy model, the *semiflexible Brownian rotor*.

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