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Polymer Depinning Transitions with Loop Exponent One

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We consider a polymer with configuration modeled by the trajectory of a Markov chain, interacting with a potential of form $u + V_n$ when it visits a particular state 0 at time n, with $\{V_n\}$ representing i.i.d. quenched disorder. There is a critical value of u above which the polymer is pinned by the potential. Typically the probability of an excursion of length n for the underlying Markov chain is taken to have form $n^{-c}\varphi(n)$ for some $c \geq 1$ and slowly varying φ. A particular case not covered in a number of previous studies is that of loop exponent $c = 1$, which includes simple random walk in two dimensions. We show that in this case, at all temperatures, the critical values of u in the quenched and annealed models are equal, in contrast to all other loop exponents, for which these critical values are known to differ at least at low temperatures.

This is joint work with N. Zygouras.