Lattice models of Knot and Link Transition Probabilities in Polymers

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Motivated by understanding the effects of enzyme action on DNA, in collaboration with Cheston, Schmirler, Szafron and Vazquez, we have been studying the effects of local strand change operations on the entanglement complexity of ring polymers in solution. Statistical mechanics self-avoiding lattice polygon models have been used to model a ring polymer in solution and we have explored the effects of both a topoisomerase-like strand-passage action as well as a recombinase-like strand-exchange operation on the knot and link types of the polygons. In this talk I will review previous results about knot-reduction and the asymptotics of knot-transition probabilities after a strand-passage action for polymers in a good solvent. Then recent extensions of these models to study the effects of salt concentration as well as to study strand-exchange operations will be discussed.