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Knot probabilities in confined lattice knots

A lattice knot is a model of ring polymer entropy in three dimensions, and has become a standard theoretical model for quantifying the entropy of a knotted ring polymer. An advantage of the model is that there are efficient Monte Carlo algorithms for sampling lattice knots, even of fixed knot or link type, in various three dimensional lattices. These models may give qualitative insights in the knotting probabilities and entanglement complexity of polymers. For example, the increase in knot probability, as a lattice polygon increases in length, suggests that long ring polymers will likely have a high degree of entanglement complexity. In this talk I shall briefly consider confined lattice knots, and in particular relative knotting probabilities when lattice knots are confined in a cube (as a model of confined knotted ring polymers). I shall review what is known about confined lattice knots, and how to approximately enumerate them using the GAS algorithm. Two ensembles of confined lattice knots will be (briefly) examined, namely a grand canonical ensemble model where lattice knots are weighted by length (by introducing a chemical potential in the model), and secondly, a canonical ensemble model with lattice knots approximately enumerated as a function of concentration in the confining volume. Results on the relative incidence of knots of various types will be presented as a function of the chemical potential, or as a function of concentration.