

Knotting transitions: the action of topoisomerase IV and glueball decay

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We will explore the effect of changing crossings in knotted and linked configurations in two different physical systems. First, Topoisomerase IV is an enzyme that efficiently unknots and unlinks bacterial DNA. The exact mechanism topoisomerase IV employs to choose its positions to act is a modern curiosity. We explore whether supercoiling can create certain geometric conditions to direct topoisomerase IV to the positions that preferably simplify knotting and linking. Second, glueballs are subatomic particles and it has been proposed that glueballs form tight knots and links. One way such a model would decay is via quantum tunneling, whereby the thick tube about the knot or link would pass through itself. We present some preliminary findings about how glueballs might decay.