I. SYNOPSIS

Since the discovery of the helicoidal structure of DNA, the phenomenon of its transformation to a coil under heating has been tackled as an equilibrium phase transition. Basic works by Lifson and subsequently by Poland and Sheraga [1, 2] led to a model that is still today the object of investigation. This one-dimensional model is known to exhibit a phase transition because of the existence of long-range interactions. Recently, some authors have proposed a new mechanism ruling DNA denaturation as an abrupt first–order phase transition [3, 4], at variance with the previous theoretical considerations in favor of a continuous one. On the experimental side the situation is still far from conclusive. Previous measurements indicated the presence of a sharp jump in the fraction of bound base pairs [5, 6]. More recently, the results reported in [7] have been interpreted as an indication of a weakly continuous phase transition. More recently some authors have concluded on rigorous mathematical basis [8] that the denaturation transition turns to a continus one in the presence of quenched disorder, in contrast with results obtained by numerical investigations [9]. Moreover, little is known about the dynamics of this denaturation transition. We can mention the contributions based on a mechanical approach [10, 11] and on a Langevin description of the two DNA–strands as polymers in continuous space [12]. More recently, this problem has been reconsidered and analyzed by analytic and numerical studies, e.g. see [13, 14].

Accordingly, a meeting making the point about such basic questions and presenting recent achievements on the LPS–model is timely and appropriate.

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