

Polymers in a Weak Random Potential in Dimension Four: Rigorous Renormalization Group Analysis

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Abstract: Correlation functions of the Edwards model of polymers at weak coupling are defined and studied at the critical point, in dimension four, by a rigorous renormalization group method which validates, at any order, perturbative renormalization group results on their behaviour at large distances. Remainders are controlled by a new argument which enlarges the use of methods of constructive field theory to models of statistical physics.

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1. Introduction

Edwards model [1] of polymers in a random potential and the alternative perturbatively equivalent [2, 4] Edwards model [2] of (possibly weakly) self-avoiding polymers play an important role in polymer theory. From the viewpoint of perturbative field theory, they coincide [3, 4] with φ^4 “at $N = 0$ components” (i.e. N is fixed at zero in perturbative formulae which a priori apply to strictly positive integer values of N). At the critical point (i.e. for theories with arbitrary size of the polymers) the basic

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