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Strings, integrability and beyond

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LPTENS, Library
Domaines : hep-th

Titre : *Logarithmic correlations in percolation and other geometrical critical phenomena*

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Résumé : *The purpose of renormalisation group and quantum field theory approaches to critical phenomena is to diagonalise the dilatation operator. Its eigenvalues are the critical exponents that determine the power law decay of correlation functions. However, in many realistic situations the dilatation operator is, in fact, not diagonalisable. Examples include geometrical critical phenomena, such as percolation, in which the correlation functions describe fluctuating random interfaces. These situations are described instead by logarithmic (conformal) field theories, in which the power-law behavior of correlation functions is modified by logarithms. Such theories can be obtained as limits of ordinary quantum field theories, and the logarithms originate from a resonance phenomenon between two or more operators whose critical exponents collide in the limit. We illustrate this phenomenon on the geometrical Q-state Potts model (Fortuin-Kasteleyn random cluster model), where logarithmic correlation functions arise in any dimension. The amplitudes of the logarithmic terms are universal and can be computed exactly in two dimensions, in fine agreement with numerical checks. In passing we provide a combinatorial classification of bulk operators in the Potts model in any dimension.*