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EXACT SOLUTION OF THE NON-LINEAR σ -MODELS

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A brief review of the recent developments in the theory of non-abelian Goldstone bosons in two dimensions, as worked out by Polyakov and myself^{1,2} is presented. Exact solutions of the non-linear σ -models were found. These are the simplest examples of field theories where geometrical constraints due to the non-abelianess of the manifold create strong interactions, leaving the theory asymptotically free at small distances. The several infrared singularities induced by increasing interactions at large distance scale impede studies of the low-energy regime by perturbative methods. However, the dynamics of the problem is governed by the infinite set of the non-trivial quantum conservation laws. It means that the theory is completely integrable and can be solved exactly by the Bethe-Ansatz technique. We have proposed such a solution for all three canonical σ -models and on this basis described completely the particle spectrum, scattering amplitudes and thermodynamic properties. We have considered

