Contribution ID: **391** Type: **Talk**

Monte Carlo simulation of ϕ_2^4 and $O(N)$ ϕ_3^4 theories

Tuesday, July 26, 2016 4:30 PM (20 minutes)

We report lattice simulations of ϕ_2^4 and $O(N)$ ϕ^4 models, performed by means a Monte Carlo method based on the all-order strong coupling expansion (worm algorithm). The investigation of the non–perturbative features of the ϕ^4 continuum limit in two dimensions lead us to the result $g/\mu^2 = 11.15 \pm 0.06_{stat} \pm 0.03_{syst}$ for the critical coupling. Furthermore we present a study of the scaling behaviour of worm and loop size in two-dimensional $O(N)$ model (non-linear σ-model) and three-dimensional ϕ^4 $O(N)$ model.

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Session Classification: Algorithms and Machines

Track Classification: Algorithms and Machines