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The Critical Properties of Two-dimensional Oscillator Arrays[1]
GABRIELE MIGLIORINI, NCRG - Aston University - UK — We present a renormalization group study of two dimensional arrays of oscillators, with dissipative, short range interactions. We consider the case of non-identical oscillators, with distributed intrinsic frequencies within the array and study the steady-state properties of the system. In two dimensions no macroscopic mutual entrainment is found but, for identical oscillators, critical behavior of the Berezinskii-Kosterlitz-Thouless type is shown to be present. We then discuss the stability of (BKT) order in the physical case of distributed quenched random frequencies. In order to do that, we show how the steady-state dynamical properties of the two dimensional array of non-identical oscillators are related to the equilibrium properties of the XY model with quenched randomness, that has been already studied in the past. We propose a novel set of recursion relations to study this system within the Migdal Kadanoff renormalization group scheme, by mean of the discrete clock-state formulation. We compute the phase diagram in the presence of random dissipative coupling, at finite values of the clock state parameter. Possible experimental applications in two dimensional arrays of microelectromechanical oscillators are briefly suggested.

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Gabriele Migliorini
NCRG - Aston University - UK

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