

Seminar in Nonlinear Systems

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Statistical mechanics of the nonlinear wave equation

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Abstract: We consider a nonlinear Klein-Gordon equation on the circle coupled to heat reservoirs at positive temperatures (linear wave equation). Under suitable assumptions the system reduces to a nonlinear wave equation forced by a finite-dimensional noise. We show that the system is well posed in Sobolev space of index $1/3$ and higher (index 1 corresponds to the energy norm). This is done by using and extending some estimates of Bourgain and others. This allows us to show that the Gibbs measure is an invariant measure for the system if the temperatures of the reservoirs are identical.

Refreshments provided