# Instanton formation, discrete field theory calculations, and improvement of I-E curve calculations for $NbSe^3$ CDW simulations (ISCOM 2009)

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The tunneling Hamiltonian is a proven method to treat particle tunneling between different states represented as wavefunctions in many-body physics. Our problem is how to apply a wave functional formulation of tunneling Hamiltonians to a driven sine-Gordon system. We apply a generalization of the tunneling Hamiltonian to charge density wave (CDW) transport problems in which we consider tunneling between states that are wavefunctionals of a scalar quantum field. We present derived I-E curves that match Zener curves used to fit data experimentally with wavefunctionals congruent with the false vacuum hypothesis. Our supposition is that indeed this is useful and that the topological arguments give evidence as to a first order phase transition which gives credence to the observed and calculated I-E curve as evidence .We conclude with a discussion of how these results can be conceptually linked to a new scheme of exact evolution of the dynamics of quantum $\phi^4$ field theory in 1+1 dimensions.