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Quantum quenching an O(N) non linear sigma model (NLSM) and oscillation experiments of high Tc underdoped cuprate superconductor[1] LING YAN HUNG, WENBO FU, SUBIR SACHDEV, Harvard Univ — Recent X-ray scattering experiments have provided strong evidence of the coexistence of a charge density wave order (CDW) and superconductivity (SC) in underdoped crystals of the prototypical high-T_c cuprate superconductor, $YB_{a_2}Cu_3O_{6+x}$. Sachdev et al have proposed a O(6) NLSM as an effective description of the competing orders, which finds excellent quantitative fit with the X-ray data. On the other hand, Hinton et al report coherent oscillations associated with CDW in these cuprates, whose phenomenology above and below T_c find qualitative match with the picture of the competing orders. Motivated by these recent results, we study the dynamical evolution of the O(6) NLSM model upon a quantum quench – a sudden disturbance of some parameters of the model to mimic the effect of the laser pulse in the oscillation experiment. As a first brush, we simplify the problem by taking the large-N limit of the O(6) NLSM. We observe a general exponentially decaying oscillations, which experiences phase shift as temperature is varied, at an extent determined by the specific choice of the parameter that is quenched. We also discuss the variation of the oscillation frequency and amplitude as various parameters are varied.

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