Modulation of Local Density of States within the d-density Wave Theory in the Underdoped Cuprates SUDIP CHAKRAVARTY, UCLA, AMIT GHOSAL, Duke University, ANGELA KOPP, UCLA — Intriguing results have been found in the recent high resolution scanning tunneling studies, pointing to the emergence of a new order in underdoped high T_c cuprates. Motivated by these results we calculated the Fourier transform spectrum of the local density of states of underdoped cuprates within the framework of a fully self-consistent Bogoliubov-de Gennes mean field theory. Our calculation is carried out for coexisting d-density wave and d-wave superconducting states in the presence of a low concentration of unitary impurities taking into account the fluctuations in the order parameters as well as the correlation between impurities. Based on our results, we propose that a d-density wave ordered state captures much of the essential physics of these spatial modulations. Our results on the nature of the modulations, their robustness and very weak dispersions of certain Fourier peaks are consistent with primary experimental findings in the underdoped BSCCO at very low temperatures.
This work was supported by the NSF (DMR-0411931).

Amit Ghosal
Duke University

Date submitted: 01 Dec 2004   Electronic form version 1.4