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Exact diagonalization study of electronic nematic and d-density wave states HYEONJIN DOH, THOMAS GRZESIAK, HAE-YOUNG KEE, University of Toronto — It was proposed that the d-density wave (ddw) and the electronic nematic states are relevant phases in the phase diagram of high T_C cuprates. The two phases break different symmetries, and their order parameters have been used to describe the characteristic broken symmetries. Here we show that the two order parameters transform into each other under a local gauge transformation, which implies that the order parameters cannot represent different broken symmetric states, if a Hamiltonian is invariant under such a transformation. The two order parameters describe distinctly different states, when the nearest neighbor hopping integral is finite, but the states are nearly degenerate at a strong coupling limit. We also present a phase diagram of a Hamiltonian with correlated hopping, and nearest neighbor repulsive interactions using Lanczos exact diagonalization where we find an interesting interplay between the ddw and nematic states. We compare our results with the previous mean field calculation, and discuss a possible relevance to a d-wave superconducting state.

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