Abstract Submitted
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Intermediate Phase in the Superconducting Cuprates.[1] TAKESHI EGAMI, University of Tennessee — It has long been speculated that upon doping the Mott-Hubbard insulator may go through an intermediate phase before becoming a Fermi-liquid metal. If there is such a phase its structure may be intimately connected to the mechanism of the pseudogap and superconductivity. The only well-defined and popular option has been the spin-charge stripe phase, but the strongly one-dimensional nature of the stripe phase is at odds with the highly two-dimensional CuO_2 plane. We propose a superlattice of $2\sqrt{2} \times 2\sqrt{2}$ in the $a-b$ plane as an alternative candidate for the intermediate phase. In this phase the Mott-Hubbard states and the Fermi-liquid phase coexist in different Brillouin sub-zones. The presence of such a phase is consistent with the recent results of the ARPES at a high energy scale (J. Graf, *et al.*, *cond-mat/*0607319), dispersion of Cu-O bond-stretching phonon mode in YBCO, pulsed neutron PDF analysis of LSCO, and our recent observation of the supperlattice peaks in $YBa_2Cu_4O_8$ single crystal by x-ray diffraction. The intensity of the superlattice peaks in $YBa_2Cu_4O_8$ decreases below 250K. This is an unusual behavior for the ordering peak, suggesting the interplay with superconductivity.

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