Reconciling Neutron and STM Results for Charge Order in Hole-Doped Cuprates

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Incommensurate elastic or inelastic magnetic neutron scattering in the cuprates has often been interpreted in terms of one-dimensional stripe arrays, either static or dynamic. Recent experiments in La$_{2-x}$Ba$_{x}$CuO$_4$ suggest that the resonance mode phenomenon may also be stripe related[1]. On the other hand, while recent STM studies in Bi$_2$Sr$_2$CaCu$_2$O$_{8+\delta}$ (Bi2212) and Ca$_{2-x}$Na$_x$CuO$_2$Cl$_2$ have found clear evidence of charge order, it is in terms of checkerboards, not stripes[2]. Intriguingly, both stripes and checkerboards have the same approximate $4a$ periodicity. There is a second puzzling feature of the STM data: there is no sign of bilayer splitting in the Fermi surface reconstructed from the STM quasiparticle interference effect. This may be related to the smearing out of the bilayer splitting in underdoped Bi2212.