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Phase separation of electrons strongly coupled with phonons in cuprates and manganites SASHA ALEXANDROV, Loughborough University — Recent advanced Monte Carlo simulations have not found superconductivity and phase separation in the Hubbard model with on-site repulsive electron-electron correlations. I argue that microscopic phase separations in cuprate superconductors and colossal magnetoresistance (CMR) manganites originate from a strong electron-phonon interaction (EPI) combined with unavoidable disorder. Attractive electron correlations, caused by an almost unretarded EPI, are sufficient to overcome the direct inter-site Coulomb repulsion in these charge-transfer Mott-Hubbard insulators, so that low energy physics is that of small polarons and small bipolarons. They form clusters localized by disorder below the mobility edge, but propagate as the Bloch states above the mobility edge. I identify the Froehlich EPI as the most essential for pairing and phase separation in superconducting layered cuprates. The pairing of oxygen holes into heavy bipolarons in the paramagnetic phase (current-carrier density collapse (CCDC)) explains also CMR and high and low-resistance phase coexistence near the ferromagnetic transition of doped manganites.

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