The superconducting phase transition in the underdoped high temperature superconductors is rather unusual, in that it is not a mean-field transition as other superconducting transitions are. Instead, it is observed that a pseudo-gap in the electronic excitation spectrum appears at temperatures $T^*$ higher than $T_c$, while phase coherence, and superconductivity, are established at $T_c$. One would then wish to understand if $T^*$ is just a crossover, controlled by fluctuations in order which will set in at the lower $T_c$, or whether some symmetry is spontaneously broken at $T^*$. Using angle-resolved photoemission with circularly polarized light, we find that, in the pseudogap state, left-circularly polarized photons give a different photocurrent than right-circularly polarized photons, and therefore the state below $T^*$ is rather unusual, in that it breaks time reversal symmetry. On the other hand, in the overdoped region, we find evidence for a new crossover line in the phase diagram between a coherent metal phase for lower temperatures and higher doping, and an incoherent metal phase for higher temperatures and lower doping. The former is characterized by two well-defined spectral peaks in ARPES due to coherent bilayer splitting and superlinear behavior in the resistivity, whereas the latter is characterized by a single broad spectral feature in ARPES and a linear temperature dependence of the resistivity.