

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Shape resonances and proximity to a structural phase transition for high T_c in La_2CuO_4 ANTONIO BIANCONI, NICOLA POCCIA, ALESSANDRO RICCI, Sapienza Università di Roma, Italy — The high temperature superconductivity in cuprates and pnictides occurs in multicomponent superconducting materials made of superlattices of superconducting units separated by spacer units. The critical temperature is amplified at the shape resonance or Feshbach resonance by the tuning the chemical potential at an electronic topological transition (ETT) [Antonio Bianconi “Process of increasing the critical temperature T_c of a bulk superconductor by making metal heterostructures at the atomic limit ”United State Patent No. :US6, 265, 019 B1, July 24, 2001]. An anomalous electron-lattice interaction at the resonance is related with the disorder driving the system to a lattice instability with multiscale structural phase separation. Here we present compelling evidence for multiscale phase separation in the optimum doped phase in a oxygen doped cuprates with mobile dopants that can be controlled by external fields. These results shed light on the critical complexity in the high T_c multilayered materials and open new perspectives for manipulation of the critical temperature via controlling dopant ordering.

Antonio Bianconi
Sapienza Università di Roma, Italy

Date submitted: 17 Dec 2009

Electronic form version 1.4