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The insulator and pseudogap states coalescence beneath the superconductor dome ALEJANDRO CABO MONTES DE OCA, ICIMAF, La Habana, Cuba, ALEJANDRO CABO-BIZET, CEADEN, La Habana, Cuba, VICTOR MARTINEZ, YOANDRI VIELZA, Department of Physics, University of Pernambuco, Recife, Brasil, CONDENSED MATTER GROUP TEAM — The pseudogap effects and the expected quantum phase transitions (QPT) in cuprate materials are yet unclear in nature. A single band Tight-Binding (TB) model for the CuO planes of these materials had predicted the existence of definite pseudogap states at half-filling, after considering that a crystal symmetry breaking and non-collinear spin orientations of the single particle states are allowed. Here we show that after including hole doping in the model, a QPT which lies beneath the superconducting dome exists and is a second order one. In it, an insulator ground state (AFI), showing strong spin fluctuations at low doping, coalesce with an excited paramagnetic pseudogap (PPG) state, exhibiting a broken lattice symmetry at the critical hole density $x_c = 0.2$. Above this value the system becomes a paramagnetic metal. The band structures and Fermi surfaces with doping are evaluated and their evolution show a close resemblance with the experimental observations, including the topological change in structure for varying hole density.

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