Abstract Submitted
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An explanation for the pseudogap states and the quantum phase transitions beneath the Dome[1] ALEJANDRO GENARO CABO, Instituto de Cibernetica, Matematica y Fisica, YOANDRI VIELZA, MAURICIO DOMINGUES, University of Pernambuco — The work present the results of a model proposed to improve the understanding of the normal state of cuprate superconductors. The analysis reproduces the antiferromagnetic correlations and insulator character of these materials. Further, the discussion led to an outstanding prediction: the existence of well defined pseudogap states, which physical origin constitutes still today a debated question. The pseudogap emerges as a paramagnetic excited state, breaking the square crystal symmetry of the CuO planes in the same way as the AF order does it in the real material. The results defined the pseudogap effect as being of pure Coulomb origin. The Fermi surface exhibits the property defining its name: a momentum dependent gap which, that closes at the four corners of the Brillouin cell. The effect of the hole doping on both the AF-Insulator and the pseudogap states was investigated. The evolutions of the energy and band structure with hole doping, became able to predict the quantum phase transition (QPT) which La2CuO4 and other cuprate materials show at doping value, laying "beneath" the superconductor "Dome". The energies of the insulator and pseudogap states, both tend to coincide at a critical doping value of 0.2, at which the QPT is observed in the material. The doping evolution of the Fermi surface evaluated in for the insulator state, reproduce the experimental results for La2CuO4.

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Alejandro Genaro Cabo Montes de Oca
Instituto de Cibernetica, Matematica y Fisica

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