Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

An explanation for the pseudogap states and the quantum phase transitions beneath the Dome[1] ALEJANDRO GENARO CABO MONTES DE OCA[2], Departamento de Fisica Teorica, Instituto de Cibernetica, Matematica y Fisica, YOANDRIS VIELZA DE LA CRUZ, MAURICIO DOMINGUES, Departamento de Fisica, Universidad de Pernambuco, Recife, Brasil — A model is presented to improve the understanding of the normal state of cuprate superconductors. The analysis reproduces the AF correlations and insulator character of these materials. The discussion also led to an outstanding prediction: the existence of well defined pseudogap states, which physical origin constitutes still today a debated question. The pseudogap phase 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 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, 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. Surprisingly, the evolution 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.

[1]One of the authors thank the support of the ICTP Network-35.
[2]The present is a replacing of the formerly submitted abstract MAR17-2016-000725 which exceeded the 1300 characters

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Date submitted: 01 Dec 2016 Electronic form version 1.4