Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Hole localization in Doped Mott Insulators TING-PONG CHOY, PHILIP PHILLIPS, UIUC — A key experimental puzzle surrounding the high-temperature copper oxide materials is the origin of the insulating behaviour in the underdoped regime. Using a self-consistent cluster method, we compute the resistivity of a lightly doped Mott insulator (described by the Hubbard model) using the Kubo formula in the one-loop approximation. We find that at high temperatures the resistivity increases as some power of temperature but at low temperatures diverges as $\exp(T_0/T)^s$ ($s \approx 0.66$) as is seen experimentally in the cuprates. The localization is due to the pseuedogap which is shown to be a ubiquitous feature of a doped Mott insulator. Quite generally, doped holes form magnetic polarons which remain localized in an otherwise antiferromagnetic background as a result of a non-perturbative phase shift. The phase shift is computed explicitly and is shown to vanish as $U \to \infty$, in agreement with the Nagaoka dilute limit.

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Date submitted: 07 Dec 2004 Electronic form version 1.4