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Theory of Optical Conductivity and Hall Conductivity in High-Tc Superconductors HIROSHI KONTANI, Nagoya University, Japan — We study AC conductivities in high-Tc cuprates, which offer us significant information to determine the true ground states. We take the current vertex correction (CVC) into account correctly to satisfy the conservation laws in terms of the fluctuation-exchange (FLEX) approximation. The significant role of the CVC on the optical Hall conductivity,$\sigma_{xy}(\omega)$, is confirmed in the presence of strong antiferromagnetic (AF) fluctuations. This fact leads to the failure of the relaxation time approximation (RTA). As a result, experimental highly unusual behaviors, (i) prominent ω and temperature dependences of the optical Hall conductivity and the optical Hall coefficient,$R_H(\omega)$, and (ii) a simple Drude form of the optical Hall angle,$\theta_H(\omega)$, for a wide range of ω, are satisfactorily reproduced. In conclusion, both DC and AC transport phenomena in (slightly under-doped) high-Tc cuprates can be explained comprehensively in terms of a nearly AF Fermi liquid, without assuming an exotic ground state.

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