Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Non-Fermi-liquid behavior of quantum magnetooscillations near a quantum critical point CHUNGWEI WANG, DMITRII MASLOV, Department of Physics, University of Florida — We study many-body effects in quantum magnetooscillations of a 2D strongly correlated system near ferromagnetic and antiferromagnetic quantum critical points (QCP). The amplitude of magnetooscillations is determined by the electron self-energy $\Sigma(\pi T, \mathbf{k}; \mathbf{T})$ averaged over the Fermi surface, at the Matsubara frequency $\omega = \pi T$ for $T > \omega_c$, where ω_c is the cyclotron frequency. The major contribution of the bosonic propagator to the electron self-energy comes from static spin fluctuations. In the spin-fermion model, the self-energy behaves as $\Sigma \propto \sqrt{T}$ in the ferromagnetic system and as $\Sigma \propto T \ln T$ in the antiferromagnetic system. This shows the non-Fermi-liquid temperature dependence of the self-energy near the QCP and the oscillation amplitude $A \propto \exp\left[-2\pi(\pi T + \Sigma)/\omega_c\right]$ can be very different from the Lifshitz-Kosevich form. The momentum dependence of the self-energy contribution to the oscillation amplitude is also discussed.

Chungwei Wang
Department of Physics, University of Florida

Date submitted: 18 Nov 2008

Electronic form version 1.4