Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Exact real-time dynamics of electron transport in mesoscopic systems XIAO ZHENG, JINSHUANG JIN, YIJING YAN, Department of Chemistry, Hong Kong University of Science and Technology, Hong Kong — We present a formally exact and numerically tractable quantum dissipation theory for time-dependent quantum transport in mesoscopic systems. It is formulated in terms of hierarchically coupled equations of motion, which govern the non-Markovian dynamics of an arbitrary fermionic system interacting with grand canonical electron reservoirs, in the presence of arbitrary time-dependent applied voltages [1-2]. We also present numerical results on the real-time dynamics of open quantum dot systems. The linear response admittance is mapped to classical equivalent circuits; while the nonlinear response dynamics is associated with dot-state transitions, such as the dynamic Coulomb blockade effect involved in interacting quantum dots [3-4]. Real-time Kondo phenomena are also demonstrated, with the cotunneling induced Kondo transition distinguished in the transient response current. This work highlights the significance and versatility of quantum dissipation theory for transient dynamics calculations. [1] J. S. Jin, S. Welack, J. Y. Luo, X. Q. Li, P. Cui, R. X. Xu, and Y. J. Yan, J. Chem. Phys. **126**, 134113 (2007). [2] J. S. Jin, X. Zheng, and Y. J. Yan, J. Chem. Phys. **128**, 234703 (2008). [3] X. Zheng, J. S. Jin, and Y. J. Yan, J. Chem. Phys. **129**, 184112 (2008). [4] X. Zheng, J. S. Jin, and Y. J. Yan, New J. Phys. **10**, 093016 (2008).

Xiao Zheng
Department of Chemistry, Hong Kong University of Science and Technology

Date submitted: 20 Nov 2008 Electronic form version 1.4