Effect of Phase-Breaking Events on Electron Transport in Long-Range Mesoscopic and Nano Systems

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Existing ballistic models for the electron transport in mesoscopic and nano systems will break down as the size of the device becomes longer than the phase coherence length of electrons in the system. V. Krstic, *et al.* observed experimentally that the current in single-wall nanotube systems can be regarded as a combination of a coherent part and a non-coherent part. When analyzing such long range electron transfer in systems like polymers or nanotubes, it is more convenient to study it in a partially coherent fashion. In this presentation, we discuss the Buttiker's dephasing model to address partially coherent electron transport, and apply it to study the effect of phase-breaking events on the electron transport in two-terminal graphene nanoribbon devices. We also discuss possible applications using other materials. The work carried out at Oklahoma State University is supported by the Department of Energy (DE-FG02-07ER46362) and the work at ORNL is supported by the Division of Materials Sciences and Engineering U.S. Department of Energy (DEAC05-00OR2272)