Testing for many-body localization in electronic system

Z. Ovadyahu *Racah Institute of Physics, the Hebrew University, Jerusalem 91904, ISRAEL*

We describe how some of the unique properties of Electron-Glasses may be used to gain information on the fundamental nature of the (Coulomb interacting) Anderson-localized phase. The experiments suggest that the electronic energy spectrum of the system remains discrete even for realistic electron-electron interaction. Therefore, electron thermalization at low temperatures hinges on the existence of a continuous bath (presumably, phonons). It is demonstrated that, in general, the conductance measured under (non-equilibrium) steady-state conditions *cannot* be used as a thermometer. Implications of these results to the issue of many-body-localization and the long-standing mystery of the pre-exponential term of hopping conductivity will be discussed.