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Slow dynamics in the GeSbTe Electron-Glass

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Abstract:

Conductivity and relaxation in electron-glasses proceed via quantum transitions between localized states. However, relaxation from an out-of-equilibrium state is controlled by qualitatively different processes than dc conductance. The latter is controlled by relatively fast elements involving sites that comprise the current-carrying-network. Relaxation, on the other hand, is determined by the slowest transitions rates which typically involve sites that do not participate in transport. Therefore, conductance and relaxation-rates might change in opposite directions upon varying parameters. It has been shown that, while conductance increases exponentially with temperature, relaxation does not change with it (or it may even become slower). In this talk it is demonstrated that adding charge to the system in a controlled way, by using persistent photo-conductivity, enhances the system conductance while hindering its relaxation. These results lend further support to the conjecture that glassy effects with long relaxation times are inherent property of Anderson insulators with high carrier-concentration.