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Anderson Insulators as Quantum Glasses

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The out-of-equilibrium transport properties of Anderson insulators exhibit many glassy features. These include slow relaxation, slow approach to a steady state, ageing, and other memory effects that are common characteristics of other types of glasses. The typical relaxation time of this, so called electron glass, may be controlled by disorder, magnetic field, and carrier concentration. Due to the absence of metallic screening, the inter-electron interaction strength increases with the concentration of carriers, which in turn slows down the relaxation processes in this medium. Interestingly, in contrast with most other glasses, the system dynamics does not slow down upon cooling below a 'glass-temperature,' a feature consistent with the behavior expected of a quantum glass.