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Quantum kinetics in layered systems DMITRII MASLOV, DMITRI GUTMAN, University of Florida — Electron transport in strongly anisotropic materials exhibit several unusual properties.In particular, the resistivity across the layers (c-axis) has either an insulating-like or non-monotonic temperature dependences, whereas the resistivity along the layers is metallic. It is generally believed that when the scattering rate, $1/\tau$, becomes larger than the tunneling rate between the layers, J, the nature of transport changes from coherent (band-like) to incoherent (tunneling-like). By using a Prange-Kadanoff–like quantum Boltzmann equation for electrons coupled to phonons, we show that there is no coherent/incoherent crossover for any value of $J\tau$, as long as the usual "good metal" condition is satisfied, i.e., $E_F\tau \gg 1$. In other words, a strongly anisotropic metal is as "coherent," as an isotropic one. The situation is changed in the presence of resonant tunneling centers between the layers. We show that the unusual behavior of the c-axis resistivity can be explained by inelastic resonant tunneling through such centers.

Dmitrii Maslov
University of Florida

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