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Nonequilibrium steady-state density of states for a strongly correlated electron system in the presence of a large electric field.[1] ALEXANDER JOURA, JIM FREERICKS, Georgetown University — The electronic density of states (DOS) of the Falicov-Kimball model in a constant uniform electric field E is calculated using a Kadanoff-Baym-Keldysh nonequilibrium Green's function technique and dynamical mean-field theory. When the electron-electron interaction U vanishes, the DOS is the Wannier-Stark ladder of delta functions spaced by the Bloch frequency. If U is increased, the delta function peaks initially broaden due to the scattering, but ultimately evolve into a continuous structure for large U's. As E is increased from small values, where linear response theory can be used and we see broadened Wannier-Stark peaks, the DOS develops a shape with large peaks at miniband edges, separated in energy by U. We verify the accuracy of our calculations by checking the DOS against frequency-moment sum rules, and an independent transient-response calculation of the Green's functions at long times. While our formalism has been applied to the Falicov-Kimball model, it can also be directly extended to other models like the Hubbard or periodic Anderson model, by using more complicated impurity problem solvers.

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