TKWANT: A SOFTWARE PACKAGE FOR TIME-DEPENDENT QUANTUM TRANSPORT

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Tkwant is a Python package for the simulation of quantum nanoelectronic devices to which external time-dependent perturbations are applied. Tkwant is an extension of the Kwant package (https://kwant-project.org/) and can handle the same types of systems: discrete tight-binding-like models that consist of an arbitrary central region connected to semi-infinite electrodes.

For such systems, Tkwant provides algorithms to simulate time-dependent manybody expectation values, such as densities and currents.

In this talk I will present the theoretical framework behind Tkwant, which is based on a wave-function approach.

For non-interacting systems, the wave-function approach is mathematically fully equivalent to the nonequilibrium Green's function formalism, but it is much better suited for numerical simulations in terms of scaling.

I will show some examples of typical Tkwant applications as well as a recent extension to include interactions as a time-dependent mean-field.

Tkwant is free software distributed under a BSD license and can be found at

https://tkwant.kwant-project.org/.