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## Modeling and Simulation of Two-Dimensional Single-Electron Dynamics

### Abstract

Next generation electron-based solid-state quantum technologies, such quantum information processing and electron quantum optics critically rely on the wave nature of individually propagating and potentially inter-acting electrons. As a consequence, a computational feasible approach is required to describe the intricate dynamical quantum transport processes. The signed-particle Wigner transport approach provides an attractive computational way of simulating these processes. This talk will present the basics of the modeling backend and shows some simulation examples focusing on two-dimensional problems including an outlook.

### Keywords

electron quantum transport, Wigner function approach, electron quantum optics, time-dependent simulations

### References

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### Biography

Josef Weinbub is an Assistant Professor (tenure-track) of High Performance Simulation in Micro- and Nanoelectronics, an IEEE Senior Member, and a Member of the IEEE Nanotechnology Council's Modeling and Simulation Technical Committee. He obtained the doctoral degree in Computational Microelectronics and the *venia docendi* (habilitation) in the field of Micro- and Nanoelectronics from the TU Wien. He was a visiting researcher at the EPCC, University of Edinburgh and at the Device Modelling Group, University of Glasgow, Scotland, UK as well as at SILVACO Inc., Santa Clara, CA, USA. He founded and now chairs the master's program Computational Science and Engineering at the TU Wien and is involved with several international scientific conferences in various management and scientific roles. He is an Associate Editor of the Journal of Computational Electronics and a Principal Investigator of various research projects funded by, e.g., the Austrian Science Fund and the Christian Doppler Research Association. Together with his team he investigates cutting-edge research problems in the area of computational micro- and nanoelectronics.