to transfer some properties of these characteristic curves belonging to $C^0([0,T];\mathbf{R}^d)$ into properties of the trajectories in the space of probability measures.

This is a joint work with Antonio Marigonda (University of Verona, Italy), Khai T. Nguyen (Penn State University, USA), and Fabio S. Priuli (CNR Roma, Italy).

Preconditioned Deterministic Solver for the Wigner Equation

J. Cervenka, P. Ellinghaus

The Wigner formalism is convenient to simulate electronic devices by describing quantum mechanics in the phase space. A deterministic approach to solving the integral formulation of the Wigner equation is presented. The integral formulation avoids the discretization of the diffusion term in the Wigner equation, which presents difficulties due to the rapid variations of the Wigner function in the phase-space.
This method considers the evolution of an initial condition as the superposition of the propagation of particular fundamental contributions. At each desired time step, all solutions of the Wigner equations of all evolving wave-packets have to be accumulated. The great memory demands of the deterministic solver during computation have been reduced by considering a spatial-sequential scheme instead of a time-sequential scheme. Because of the independency of the fundamental contributions, this method shows excellent scalability via parallelization.
Moreover, a preconditioning is shown, which dramatically reduces the computational time.
The simulation results of an RTD – a quantum mechanical device – will be shown and compared to results obtained from a stochastic approach as well as with solutions of the Schroedinger equation.

Shortest-Path Queries in Planar Graphs on GPU-Accelerated Architectures

G. Chapuis, H. Djidjev

We develop an efficient parallel algorithm for answering shortest-path queries in planar graphs and implement it on a multi-node CPU-GPU clusters. The algorithm uses a divide-and-conquer approach for decomposing the input graph into small and roughly equal subgraphs and constructs a distributed data structure containing shortest distances within each of those subgraphs and between their boundary vertices. For a planar graph with n vertices, that data structure needs $O(n)$ storage per processor and allows queries to be answered in $O(n^{1/4})$ time.