



5th Workshop

MULTISCALE PROBLEMS IN QUANTUM MECHANICS
AND AVERAGING TECHNIQUES

WIAS Berlin, September 22–23, 2005

The Weierstrass Institute for Applied Analysis and Stochastics (WIAS) hosts the 5th workshop on *Multiscale Problems in Quantum Mechanics and Averaging Techniques* in the framework of the DFG Priority Program 1095 *Analysis, Modeling and Simulation of Multiscale Problems*.

The focus of the workshop is on averaging methods for partial differential equations and multiscale problems arising from the quantum mechanical modeling and simulation of semiconductor nanostructures and their embedding into semiconductor devices.

Topics are: many-particle systems, quantum-classical coupling, time averages, quantum hydrodynamics, adiabatic and scaling limits, semiconductor nanostructures, electronic structure calculation, upscaling to semi-classical models.

Special Guests

Irene Gamba, Peter Markowich, Francis Nier, Riccardo Sacco

Organizers

Anton Arnold, Ansgar Jüngel, and Hans-Christoph Kaiser

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<http://www.wias-berlin.de/workshops/mspqcm05>

Thursday September 22, 2005

- 9:30* Opening address
- 9:45* PETER MARKOWICH: On Bose-Einstein condensation
- 10:30* Coffee break
- 11:00* BARBARA NIETHAMMER: An averaging method to capture effective properties in interacting particle systems
- 11:30* JOSIPA-PINA MILISIC: Numerical approximations of quantum hydrodynamic models
- 12:00* Lunch break
- 14:00* BURKHARD SCHMIDT: Quantum-classical Liouville dynamics
- 14:30* CAROLINE LASSER: Resonances of a conical level crossing
- 15:00* ULRICH MAUTHNER: Space-adiabatic perturbation theory for Dirac electrons in a periodic potential
- 15:30* Coffee break
- 16:00* FRANCIS NIER: Computing the steady states of resonant tunneling structures via an asymptotic model
- 17:15* IRENE GAMBA: Quantum charged hydrodynamic transport and the boundary value problem (MATHEON lecture)
- 18:15* Open discussion: Perspectives in multiscale quantum mechanics
- 20:00* Dinner at the historical restaurant RAABE–DIELE

Friday September 23, 2005

- 9:00* HEINZ-JÜRGEN FLAD: Best N-term approximation in electronic structure calculations
- 9:30* HONGJUN LUO: Linearized approximations to relativistic minimax principle
- 9:45* RICCARDO SACCO: Multi-physics simulation of nanoscale semiconductor devices
- 10:30* Coffee break
- 11:00* MATTHIAS EHRHARDT: Discrete non-local boundary conditions for split-step Padé approximations of the one-way Helmholtz equation
- 11:30* FRANCESCO MAGGI: Confining thin elastic sheets and paper folding
- 12:00* SEBASTIAN BAUER: Radiative friction in classical electrodynamics