Mathematisches Kolloquium

Am Freitag, 06. Juli 2012, um 16 Uhr c.t. spricht

Prof. Dr. Ansgar Jüngel
(Technische Universität Wien)
im Hörsaal A027 über das Thema

Diffusive quantum fluid equations: modeling and analysis

Zusammenfassung: The microelectronics industry is heavily based on the construction of faster, smaller, and more efficient semiconductor devices. Quantum semiconductor structures may fulfill these requirements also in the future. These structures can be described by open quantum systems in which quantum diffusion plays an important role. For efficient numerical simulations, fluid-type quantum models provide a compromise between physical accuracy and computational cost. In this talk, macroscopic dissipative quantum models will be derived and analyzed. Starting from a collisional Wigner equation, a moment method and (formal) Chapman-Enskog expansion in different regimes leads to quantum diffusion equations and quantum Navier-Stokes systems. The mathematical structure of these highly nonlinear models will be analyzed, and the global-in-time existence of weak solutions is shown. Key ideas are entropy dissipation methods, systematic integration by parts, and the use of a new osmotic velocity variable. Finally, numerical simulations for a simple resonant tunneling diode illustrate the behavior of the solutions.

Alle Interessierten sind hiermit herzlich eingeladen. Eine halbe Stunde vor dem Vortrag gibt es Kaffee und Tee im Sozialraum (Raum 448) im 4. Stock.

Treffpunkt zum Abendessen um 18.00 Uhr wird noch bekannt gegeben.