LUND UNIVERSITY

NANOLUND

AT THE FOREFRONT OF NANOSCIENCE

Prof. Gerhard Klimeck
Purdue University

NANOSCIENCE COLLOQUIUM

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NEMO5, a Parallel, Multiscale, Multiphysics Nanoelectronics Modeling Tool

The downscaling of electronic devices has reached the range where the number of atoms in critical dimensions is countable, geometries are formed in three dimensions, and new materials are being introduced. Under these conditions one can argue that the overall geometry constitutes a new material that cannot be found as such in nature. The interactions of electrons, photons, and lattice vibrations are now governed by these new material properties and longer-range interaction mechanisms such as strain and gate fields. The Nanoelectronic Modeling tool suite NEMO5 is aimed to comprehend the critical multi-scale, multi-physics phenomena and deliver results to engineers, scientists, and students through efficient computational approaches. NEMO5's general software framework easily includes any kind of atomistic model and is, insofar, able to compute atomistic strain, electronics band structures, charge density, current and potential, Schrödinger eigenvalues and wave-functions, phonon spectra, and non-equilibrium Green functions (NEGF) transport for a large variety of semiconductor materials and the software is entirely parallelized. We believe that such modeling capability is not available in any other modeling tool at this time. The work conducted in the group spans a wide range of devices and concepts from work with the leading semiconductor industries on technologies for the sub 10nm transistors, over optical devices to improve lighting, to foundational device physics for quantum computing in Silicon.

Host: Andreas Wacker (Mathematical Physics)