

## SEMINAR

**Friday, 11th of May 2012 at 11:30**

**Institute of Physics University of Rostock 18051 Rostock, Germany**

### **Abstract**

"Fast quantum Monte Carlo on GPU."

I will describe recent efforts to parallelize quantum Monte Carlo for use with graphical processing units (GPUs). Modern graphical cards often feature GPUs with several hundreds of single computing cores. Arrays of such cores are designed to execute in parallel using single instruction-multiple data parallel model. Such vector parallelization suits well the applications in scientific computing. GPUs produced by Nvidia, a market leader in such GPU products, may be conveniently programmed with an extensions of the standard programming languages called CUDA (Compute Unified Device Architecture) framework. I will report my recent work in parallelizing variational Monte Carlo for use with the Nvidia GPU cards. Acceleration of up to fifty times was achieved when comparing GPU execution with a single-core CPU run. Thanks to such an improvement in speed, variational calculations of a liquid helium system with over ten thousand particles can be comfortably performed on a regular desktop workstation. The talk will focus on details of the NVidia GPU architecture and its relation to the CUDA programming model. I will also cover some practical considerations that are important for starting a new CUDA project.