Temple University Mathematics Colloquium

Andreas Frommer

Bergische Universität Wuppertal

will speak on

Lattice QCD simulations and the matrix sign function

ABSTRACT: Lattice QCD is a discretization of Quantum Chromodynamics, the fundamental physical theory of the quarks as the constituents of matter. In lattice QCD simulations, a hybrid Monte Carlo process is used to obtain an ensemble of thermalized configurations from which physical observables can be computed. This process is very costly, computationally, and a substantial part of the world's supercomputer time is spent in such computations.

After a brief overview over the physics, this talk will mainly address the computational and algorithmic challenges in lattice QCD. After discussing interesting properties of a basic object, the Wilson fermion matrix, we will focus on the so-called overlap operator for which the sign function of a huge sparse matrix has to be computed. We will also briefly address QPACE, the green TOP500 leading supercomputer developed by a consortium of IBM Germany, the Research Center Jülich and the universities of Regensburg and Wuppertal.

Monday, 1 March 2010
Lecture at 4:00 pm
Coffee, tea, and refreshments from 3-5 pm
Room 617, Wachman Building
Department of Mathematics