

## Talk announcement

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Monday, March 14, 2016

15:30, S2 416-2

## **Large-Scale Scientific Computing: Applications and Theory**

The talk is devoted to numerical methods and algorithms for large-scale scientific computing. The considered models are based on FEM approximation of coupled multiscale and multiphysics problems described by partial differential equations. The presented applications include bone microstructure analysis, and computer simulation of radiofrequency hepatic tumor ablation and dynamics of structures. A particular focus of the discussion is related to optimal complexity and computational scalability. The parallel efficiency tests are run on IBM Blue Gene/P machine.

The second part of the talk is devoted to construction and analysis of robust multilevel methods for anisotropic higher order FEM problems, and high-frequency and high-contrast problems. Some advantages of the nonlinear AMLI methods including the case of element-by-element approximation of the Schur complement are discussed. The last part of the talk is devoted to the recently introduced auxiliary space multigrid method for highly heterogeneous media based on preconditioning of the related weighted  $H(\text{div})$ -norm.