



JOHANNES GUTENBERG  
UNIVERSITÄT MAINZ

# Seminar: Hard Condensed Matter Theory

**Room: Galileo room, 01-128 (Staudinger Weg 9)**

**Time: Tuesday, 23.08.2017, 14:00**

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## **MuMax<sup>3</sup>: GPU-accelerated Micromagnetism**

Micromagnetism provides a description of the magnetization at the sub-micrometer length scale. On one hand, one can resolve the inner structure of domain walls and topological spin structures, such as skyrmions and vortices, by minimizing the micromagnetic free energy. On the other hand, one can study the dynamics of the magnetization by solving the Landau-Lifshitz-Gilbert (LLG) equation. E.g. spin waves and the effect of spin polarized currents on topological spin structures can be studied by solving this differential equation. In a few simple cases, one could use analytical techniques. However, when the system of interest becomes more complex, one has to resort to a numerical approach to minimize the energy or solve the LLG equation.

In this talk, I will present MuMax<sup>3</sup>, a micromagnetic software package developed at the DyNaMat group at the university of Ghent. This simulation package solves the LLG equation using a finite-difference discretization. The software is heavily optimized to run on NVIDIA GPUs, which results in a high performance, allowing to perform large-scale simulations within a reasonable computation time. After giving a short tutorial on how to use MuMax<sup>3</sup>, I will list some of its useful features and present a few interesting examples.

**All interested are cordially welcome!**

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