

# Bachelor Thesis or Project Work

## Parallelization of a Financial Market Model

**Course of study:** CES and Computer Science  
**Kind of thesis:** High Performance Computing  
**Programming language:** C/C++, experience in HPC (especially CUDA) is a plus  
**Start:** October 2015

### Problem

One challenging task in economics is to explain the formation of stylized facts in financial data. Stylized facts are universal market properties, which can be observed at stock markets all over the world. One famous example are Pareto tails in income distributions and stock returns. To give an answer to this question it is necessary to have a model of financial markets.

One very popular approach is to model a financial market as a random walk model of many interacting agents. The goal of these models is to discover connections between the microscopic behavior of agents and the appearance of stylized facts. One can imagine that the number of agents might influence the simulation results heavily. The goal of this project is to parallelize the code of such models and analyze the effect of large agent number.



**Preliminary Work and Task** There exist several codes of agent-based financial market models, implemented in MATLAB. The task is to write a CUDA implementation of the existing model with a focus on efficiency to test the limit of the number of agents tending towards infinity. For this purpose, the MathCCES institute hosts two NVIDIA Tesla K20c GPUs, which will be the main target for the implementation.

### Supervision

This project takes place in the research group *Computational Nuclear Engineering* (MathCCES) led by Prof. Dr. Martin Frank at the institute MathCCES. The project will be supervised by

Contact:	<b>Torsten Trimborn, M.Sc.</b>	<b>Thomas Camminady, M.Sc.</b>
Address:	Lehrstuhl für Mathematik (CCES) Schinkelstr. 2, 52062 Aachen	Lehrstuhl für Mathematik (CCES) Schinkelstr. 2, 52062 Aachen
Room:	219 (Rogowski building, 2nd floor)	328d (Rogowski building, 3rd floor)
Tel.:	(+49) (241) 80-98671	+49 (241) 80-98665
Email:	trimborn@mathcces.rwth-aachen.de	camminady@mathcces.rwth-aachen.de