

# M a s t e r T h e s i s

## Microbial cell-cell variability investigation with microfluidic single-cell analysis

### Background:

The *Modeling and Simulation Group* is interested in using time-lapse videos of microfluidic lap-on-a-chip microbial cultivation for data-driven modelling of biological processes. To this end, several methods for automated analysis have been developed in the recent years.

### Project description:

The fact that even isogenic cells respond differently to environmental changes has become well accepted. However, the reasons of this cell-cell variability are diverse and the mechanisms that trigger the variability vastly unknown. Unravelling aspects of these questions is of high value for basic as well as industrial research.

You will investigate physiological processes by means of growth, cell cycle, morphology or fluorescent signals with the platform organisms like *Escherichia coli* or *Corynebacterium glutamicum*. You will have the opportunity to acquire hands-on experiences with performing experiments on your own and will develop statistical models to describe the data.

Specific projects are available with more modelling, computational or image analysis related focus. Ideally, the project is combined with a prior practical semester.

### Your Qualifications:

Excellent and highly motivated student of (bio)informatics, (bio)physics, biotechnology, biomathematics, control engineering or a related field with good communication skills and strong interest in interdisciplinary research as well as very good programming skills (e.g. Java, Scala, C++, Python, Matlab).

### About us:

The *Modeling and Simulation Group* is part of the IBG1: Biotechnology, located at the Research Center Jülich (Forschungszentrum Jülich GmbH). The project is a prime example for research at the interface of biology, engineering sciences and computational analysis. We offer an open, multidisciplinary and interesting research environment within young and dynamic groups.

### Contact:

Dr. **Katharina Nöh** | [k.noeh@fz-juelich.de](mailto:k.noeh@fz-juelich.de)  
**Christian Sachs**, MSc. | [c.sachs@fz-juelich.de](mailto:c.sachs@fz-juelich.de)

Modeling and Simulation Group • IBG-1: Biotechnology  
Forschungszentrum Jülich • 52425 Jülich • Germany

[fz-juelich.de/ibg/ibg-1/modsim](https://fz-juelich.de/ibg/ibg-1/modsim)  
[github.com/modsim](https://github.com/modsim)

