

# Open Ph.D. student position



DFG-funded project

“An economic network theory of cell metabolism”

## Large-scale economic model of growing budding yeast

**Background:** The project “An economic network theory of cell metabolism” is concerned with the mathematical modelling of cell metabolism based on optimality principles. Constrained-based, kinetic, and simplified whole-cell models combine knowledge about network structure, thermodynamics, kinetics, enzyme regulation, and allocation of cellular resources. A unified theoretical framework will facilitate the systematic construction, combination, and analysis of all such models. For more information about the project, visit: [www.metabolic-economics.de/project-metabolic-economics.html](http://www.metabolic-economics.de/project-metabolic-economics.html)

**Topic and objectives:** The Ph.D. student will build and analyse a Resource Balance Analysis (RBA) model of the budding yeast *S. cerevisiae* and will compare simulation results to predictions from existing coarse-grained whole-cell models. This work will be a first step towards the RBA modelling of eukaryotic cells, accounting for cell compartments and linking global dynamics such as cell growth and ribosome production to details of cell physiology, e.g., the usage of metabolic pathways. The tasks will include investigations of complex behaviour in stationary phase (e.g., protein turnover and stress responses), as opposed to adaptations in fast-growing cells.

**Ph.D. advisors:** The Ph.D. student will be supervised by Wolfram Liebermeister (Charité Berlin and INRA, Jouy-en-Josas; France) and co-supervised by Hermann-Georg Holzhütter (Charité Berlin) and Edda Klipp (Humboldt University Berlin). Part of the project may be carried out at INRA Jouy-en-Josas (near Paris).

**Qualifications:** Applicants must hold the necessary qualifications entitling them to undertake doctoral studies in Germany, normally a M.Sc. degree, or equivalent, in biology, computer science, mathematics, physics, or related disciplines. Applicants must not yet hold a doctoral degree and should be fluent in written and spoken English. Knowledge of yeast metabolism, familiarity with computational modelling approaches such as Flux Balance Analysis, and research experience, particularly in systems biology or computational modelling, are desirable.

**Start date:** As soon as possible.

**How to apply:** Please send a letter of interest, a copy of your CV, and copies of your degree transcripts in English or German to Wolfram Liebermeister, at [wolfram.liebermeister@gmail.com](mailto:wolfram.liebermeister@gmail.com)

Applicants will be interviewed by telephone or Skype. Review of applications will be ongoing and continue until the position is filled.

For further information about the position, please contact Dr. Wolfram Liebermeister.