Project Proposal

Project leader: Elmar Schiebel and Francois Nedelec

Number of open positions: 1

Short description of the research area and the announced PhD project (no details are needed):

Title: Mechanics of anaphase spindle extension

The topic of the project is the segregation of chromosomes in mitosis. Misregulation of chromosome segregation can lead to disease including the development of cancer.

The successful candidate will analyse how the mitotic spindle extends and segregates the chromosomes in anaphase. The model organism is budding yeast *Saccharomyces cerevisiae* which allows to combine genetics, cell biology and biochemistry. In the centre of our analysis is the microtubule-binding protein Ase1 that crosslinks spindle microtubules and is fundamental in recruiting proteins to the middle of the anaphase spindle e.g. kinesin motor proteins. Spindle extension in anaphase is determined by a complex balance of crosslinks of the anti-parallel microtubules by the Ase1 protein and the force provided by the kinesin motor proteins Cin8 and Kip1. The project includes experimental analysis of anaphase in wild type and mutant cells. In a second phase the data will be modelled to provide a detail understanding of the mechanics of anaphase. A background in physics or modelling is not essential but very welcome.

Literature:

Khmelinskii, A., and E. Schiebel. (2008). Assembling the spindle midzone in the right place at the right time. *Cell Cycle*, 7:283-286.

Khmelinskii, A., C. Lawrence, J. Roostalu and E. Schiebel. (2007). Cdc14-regulated midzone assembly controls anaphase B. *J. Cell Biol.*, 177:981-993.

Pereira, G. and E. Schiebel (2003). Separase regulates INCENP-Aurora B anaphase spindle function through Cdc14. *Science*, 302: 2120-2124.

Nedelec F. and D. Foethke (2007) Collective langevin dyanmics of flexible cytoskeletal fibers. *New Journal of Physics 1367-2630/9/11/427.*

Janson M., R. Loughlin, I. Loiodice, C. Fu, D. Brunner, F. Nedelec and P. Tran (2007) Crosslinkers and motors organize dynamic microtubules to form stable bipolar arrays in fission yeast. *Cell 128; 357-68.*