

The biophysics research group **at the Faculty of Mathematics and Natural Sciences** at the University of Cologne invites applications for a

PhD position (m/f) in Single-Molecule Analysis

starting January 1st, 2018 with a weekly working time of 25,89 hours (65% position). The initial contract is limited to December 31st, 2019. The salary is based on the German E13 TV-L scale if terms and conditions under collective bargaining law are fulfilled.

Our research: Horizontal gene transfer can speed up adaptive evolution; in particular it is involved in acquisition of antibiotic resistance. At the molecular scale, our lab focuses both on the molecular mechanism of bacterial transformation (a form of horizontal gene transfer). At the population level, we develop methods for quantifying its costs and benefits during adaptive evolution. To this end, biologists and physicists work in close collaboration.

The project: The project will focus on the molecular mechanism of DNA uptake during transformation. The question how bacteria and eukaryotic cell organelles import and export macromolecules is poorly understood.¹ We have recently obtained experimental evidence for a biophysical mechanism driving DNA uptake during transformation, namely the translocation ratchet². The central research goal of this project will address the question how the biochemical properties of the involved molecules affect the biophysical properties of the molecular motor driving DNA uptake. For example, how do binding affinity and stoichiometry of chaperones affect velocity and force of the motor?

Research techniques applied in this project will include, but are not limited to:

- laser tweezers for studying DNA uptake at the single molecule level
- molecular biology, in particular design and generation of bacterial mutant strains
- protein purification and characterization of binding equilibria
- super-resolution microscopy (Photo-Activated Localization Microscopy, PALM and Stochastic Optical Reconstitution Microscopy, STORM)
- quantitative image and data analysis
- developing and planning research projects

The position: Start in January 2017 or later (0.65 E13). The PhD students will have the opportunity to join the Graduate School for Biological Science at the University of Cologne (<http://www.gs-biosciences.uni-koeln.de>).

Your profile: Required criteria are: M.Sc. in biochemistry or comparable, skills in molecular cloning and strong interest in optical methods are mandatory. Experience in biophysics or molecular microbiology are beneficial but not essential. Applicants should be highly motivated, creative and independent individuals and have an excellent academic record.

Applications from disabled persons are welcome. Disabled persons with equal qualifications will be given priority. Applications from women are specifically encouraged. Women with comparable qualifications will receive particular consideration, unless another applicant displays compelling reasons to prefer this person.

Please send your application (cover letter, CV, list of publications, certificates, and two references) as a single PDF file by email to berenike.maier@uni-koeln.de. It is mandatory that you visit Cologne for an interview.

¹ Hepp, C. & Maier, B. (2017) *Bioessays* 39(10), 1700099

² Hepp, C. & Maier, B. (2016) *PNAS* 113(44), 12467