

Eleven PhD and two Post doc (PD) positions are available in the context of a European Marie Curie Initial Training Network (ITN), entitled 'Network for Integrated Cellular Homeostasis' (NICHE).

The network is composed of nine groups from the Netherlands, United Kingdom, Germany and Spain. Our team is multidisciplinary, incorporating microbial physiology, chemistry, molecular biology and protein biophysics, advanced spectroscopy and microscopy, deep-sequencing technologies and *ab initio* modeling. The aim of the program is to advance our understanding of the homeostatic mechanisms of bacteria *via* predictive modeling and state-of-the-art experimental approaches. The focus of NICHE is on ion homeostasis in *Escherichia coli*, which includes cell physiology, membrane biology and ultrastructural analyses of the cells under ionic and osmotic stress conditions. We are seeking excellent students and post-docs who can work in a multidisciplinary environment and are willing to spend one or more periods in the laboratory of the collaborating group(s), that is, they must comply with the EU rule of mobility.

These ESRs will be hired for 36 months each and will be expected to pursue a PhD. Candidates must be in possession of a relevant Masters degree or Bachelors degree (in case of students who apply in the U.K.), or very close to obtaining it, at the time of appointment. ¹

Candidates will also be subject to local recruitment policies.

Salary will be according to EU regulations (Marie Curie ITN Early Stage Researcher). The network will provide an excellent opportunity for scientific and personal development, with regular training events and meetings across Europe.

Geographic mobility and eligibility requirements for Early Stage Researchers apply. The candidates:

- 1- should not have a PhD
- 2- should have less than 4 years of research experience
- 3- must not have resided or carried out their main activity in the country of the host institution for more than 12 months in the 3 years immediately prior to their recruitment

Applicants should submit by email: (i) detailed cover letter outlining their research agenda, (ii) curriculum vitae, (iii) scanned copies of degree certificates, and (iv) the names and email addresses of two confidential references.

The letter should be sent by email to the chosen primary supervisor AND to the Coordinating Office of the ITN-NICHE network (Ms. Karlien Groothoff, Centre for Synthetic Biology, University of Groningen, Email: syntheticbiology@rug.nl).

¹ *Early-stage researchers must be, at the time of recruitment by the host organisation, in the first four years (full-time equivalent) of their research careers and have not yet been awarded a doctoral degree. **This is measured from the date when they obtained the degree which would formally entitle them to embark on a doctorate**, either in the country in which the degree was obtained or in the country in which the research training is provided, irrespective of whether or not a doctorate is envisaged.*

PhD1 will focus on the structure and dynamics of the cytoplasm, whereas PhD2 will analyze the structure and dynamics of the *E. coli* membranes.

Biochemical methods combined with advanced microscopic approaches, incl. confocal imaging, FRAP, FCS and super-resolution microscopy, will be used to uncover the mechanisms underlying ion homeostasis. The candidates should have a background in biochemistry/biophysical chemistry, preferably in combination with molecular biology.

Primary supervisor: Bert Poolman, Membrane Enzymology, University of Groningen, The Netherlands

Secondary supervisor: to be decided

For further information on the position, please contact Prof. Bert Poolman (b.poolman@rug.nl).

For the scientific environment, please visit www.rug.nl/fmns-research/enzymology

PhD3 will focus on translational mechanisms that control the protein abundance, whereas PhD4 will focus on dynamics of macromolecular interactions in translation during stress.

Rigorous biochemical methods complemented with ribosomal profiling with nucleotide resolution, deep sequencing and mass spectrometry on global cellular scale will be used to understand how stress influences translation fidelity and to uncover the mechanisms the cell employs to counteract external stress on the level of translation.

Primary supervisor: Dr. Zoya Ignatova, Institute of Biochemistry and Biology, University of Potsdam, Germany

Secondary supervisor: to be decided

For further information on the position, please contact Dr. Zoya Ignatova (ignatova@uni-potsdam.de).

For the scientific environment, please visit www.uni-potsdam.de/ibb/arbeitsgruppen

PhD5 and PhD6 will focus on ion channels and transporters involved in maintenance of homeostasis. Both students will receive training in a range of modern molecular, biochemical and biophysical techniques. PhD5 will focus on the role of Ktn domains in potassium homeostasis. The aim is to understand the molecular mechanisms of regulation of K⁺ transport. PhD6 will focus on the assembly, localisation and function of mechanosensitive channels. The goal is to determine assembly alterations as a result of environmental changes and alterations in the cytoplasmic constitution. The student will also investigate the activity of newly identified channels using patch-clamp techniques and by in vivo assays. Candidates should have a background in biochemistry, biophysical chemistry or microbiology, preferably in combination with molecular biology.

Primary supervisor: Dr. Samantha Miller, School of Medical Sciences, University of Aberdeen, UK

Secondary supervisor: to be decided

For further information on the position, please contact Dr. Samantha Miller (sam.miller@abdn.ac.uk).

For the scientific environment, please visit <http://www.abdn.ac.uk/ims/staff/details.php?id=sam.miller>

Please also see <http://www.abdn.ac.uk/jobs>

Applicants should follow the instructions as detailed at www.abdn.ac.uk/jobs. Applications should not be sent directly to Dr S Miller but informal enquiries are welcome.

Please also send your application letter to syntheticbiology@rug.nl

PhD7 will focus on formulating a mathematical model of K⁺ regulation.

Using existing and newly generated data, the student will develop mathematical models to predict how the abundances in the pools of the ligand species which bind to the K⁺ transport mechanisms in *E. coli* determine the overall potassium transport dynamics. During the project, the student will learn and apply many different techniques in modelling and systems biology, including deterministic modelling

using ODEs; stochastic modelling using Petri nets and Markov processes; and numerical techniques such as ODE integration, the Gillespie algorithm and global optimization for parameter fitting. The project will involve close collaboration with biologists in Aberdeen and elsewhere.

Primary supervisor: Dr. Alessandro Moura, Institute for Complex Systems and Mathematical Biology, University of Aberdeen, UK

Secondary supervisors: Dr. Samantha Miller and Prof. Ian Booth

For further information on the position, please contact Dr. Alessandro Moura (a.moura@abdn.ac.uk).

For the scientific environment, please visit <http://www.abdn.ac.uk/icsmb/>

PhD8 will focus on modeling homeostatic protein expression profiles and their dynamics in *E. coli*.

We will develop a model for protein synthesis that focuses on translational control of gene expression for the bacterium *E. coli*. The model will be explicitly expressed in order to understand the effect of molecular crowding and other stress induced conditions on the rate of protein synthesis. The aim is to predict changes in the amount of mRNA, in the translation profiles and finally in the protein level. The candidate should have a background in statistical physics and on stochastic processes.

Primary supervisor: Angelo Valleriani, Department of Theory and Bio-Systems, Max Planck Institute of Colloids and Interfaces, Germany

Secondary supervisor: to be decided

For further information on the position, please contact Dr. Angelo Valleriani (angelo.valleriani@mpikg.mpg.de).

For the scientific environment, please visit <http://www.mpikg.mpg.de/english/05-theory/researchGroups/stochasticProcesses/index.html>

PhD9 will focus on mathematical model selection and optimal experimental design in systems biology. The main objective will be to use optimal experimental design methods to devise the necessary dynamic experiments for *E. coli* homeostasis modelling. Candidates should have a strong background in mathematical modelling, statistics and nonlinear analysis.

PhD10 will focus on advanced model identification and parameter estimation in systems biology. The main objective will be to devise new model calibration methods and to apply them to compute the parameters of *E. coli* homeostasis dynamic models from experimental (input-output) data. Candidates should have a strong background in mathematical modelling, statistics and, ideally, software development and high performance scientific computing.

Primary supervisor: Julio R. Banga, IIM-CSIC, Vigo, Spain

Secondary supervisor: to be decided

For further information on the position, please contact Julio R. Banga (julio@iim.csic.es).

For the scientific environment, please visit http://www.iim.csic.es/~julio/SB_research

The Spanish National Research Council (CSIC) is the largest public institution dedicated to research in Spain and the third largest in Europe (www.csic.es).

PhD11 will focus on mathematical modelling of biological data.

A challenge for developing new therapies is understanding the connection between short-term changes in biological process and the effects on long term disease progression. The objective of the research is to develop mathematical models that incorporates both the various populations of cells, in different points of the cell cycle and spatial effects of nutrient (or/and Dr.ug delivery). The work will undergo through the following steps: (a) how phenotypic effect biomarkers can support the parameter estimation of these models when applied to data from in vivo xenograft experiments; (b) methods of stabilising parameter estimation due to the potentially sparse and variable data to be considered.

Primary supervisor: Dr. James Yates, AstraZeneca, UK

Secondary supervisor: to be decided

For further information on the position, please contact Dr. James Yates (James.Yates@astrazeneca.com).

For the scientific environment, please visit <http://www.astrazeneca.co.uk/rnd/>

PD1

Applications are invited for a post-doctoral researcher to work under the supervision of Dr. Stuart Conway in the Department of Chemistry at the University of Oxford. The position will involve small molecule tools to investigate cellular homeostasis in bacteria, with a particular focus on developing probes for the bacterial potassium efflux system KefC (PNAS **2010**, 107, 19784) and the mechanosensitive channel MscS. The project is highly interdisciplinary in nature and will be undertaken in collaboration with Prof. Ian Booth, Dr. Samantha Miller and Dr. Tim Rasmussen (University of Aberdeen), Prof. Bert Poolman (University of Groningen) and Prof. Zoya Ignatova (University of Potsdam). The post is available for 12 months in the first instance, with the possibility of renewal for another 12 months. The successful candidate will have a PhD in synthetic organic chemistry / chemical biology involving synthetic chemistry, ideally with some experience of synthesising probes for biological systems, an enthusiasm for working at the chemistry-biology interface and a strong track-record of first-author publications in internationally recognised peer-reviewed journals. In order to best fit with the timescale of the NICHE programme, it is envisaged that the position will commence in July 2012.

Primary supervisor: Dr. Stuart Conway, Department of Chemistry, University of Oxford, UK

Secondary supervisor: to be decided

For further information on the position, please contact Dr. Stuart Conway (stuart.conway@chem.ox.ac.uk).

For the scientific environment, please visit <http://conway.chem.ox.ac.uk>

Please also see <http://www.chem.ox.ac.uk/jobs.asp>

Applicants should follow the instructions as detailed at <http://www.chem.ox.ac.uk/jobs.asp>

Applications should not be sent directly to Dr. S. Conway but informal enquiries are welcome.

Please also send your application letter to syntheticbiology@rug.nl

PD2

Applications are invited for a post-doctoral researcher (bioinformatics or molecular biology) to work under the supervision of Dr. Hans Roubos at the DSM Biotechnology Center. The 2-year position will develop methods to access transcriptional and translational response to protein stress under industrial production conditions. The project will involve the creation of a collection of R&D strains, subsequent evaluation of protein stress in high-throughput downscaled MTP fermentations and application of genomics (TX, PX, MX) profiling methods. Overall aim is to develop a better understanding of protein stress and develop metabolic engineering strategies to circumvent such stress, while maximizing protein yields. The project is interdisciplinary in nature and will involve molecular biology, bioinformatics and automation experts. Candidates should have a strong background in either bioinformatics or molecular biology. This is an excellent opportunity to experience corporate R&D while being part of a large academic ITN network. Publication of results is supported by the company. Intended start Q2 2012.

Primary supervisor: Dr. Hans Roubos, Dep. of Genetics, DSM Biotechnology Center, The Netherlands

Secondary supervisors: Dr. Liang Wu, Prof. Roel Bovenberg

For further information on the position, please contact Dr. Hans Roubos (hans.roubos@dsm.com).

For the scientific environment, please visit <http://www.dsm.com>