Life Sciences
Newsletter 7

Soft Matters
October ´09

To support high-throughput screenings the School of LIFENET invests in an Automation Platform at the ZBSA

Molecular-biological assays for the analysis of biological processes are becoming more and more complicated and can take many days up to months before being finished.
For these assays and in order to be able to simultaneously investigate many different RNAs, DNAs or proteins, scientists are now-a-days supported by novel apparatus that automatically combine different steps of various assays for high-throughput cell screening. The school of LIFENET has strategically invested in the purchase of such an automation platform, which has been set up at the Center for Systems Biology (ZBSA) in March.

This 10 m3 mini-lab combines a comprehensive repertoire of basic laboratory equipment and high-end fluorescence micropolate readers operated by multifunctional pipetting and gripper arms. Barcode-controlled sample management is implemented by an integrated carousel and incubator. The lab on the second floor of the ZBSA had to be completely rebuilt and adapted to the needs of this robotic platform.

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Since March, Microbial Genetics Professor Anke Becker, who also is a specialist for automation processes, has been programming the robot in collaboration with the company Tecan. The set-up required the integration of

laboratory equipment (e.g. PCR machines, shaker, readers, vacuum station and incubators) into the basic platform and feeding of coordinates and functions to the computer-operated control unit.
According to Anke Becker, learning how to program and subsequently being able to independently use the platform will take about a year, therefore, the robot can initially only be operated by a specialist.
As a result, the platform will later on be used exclusively by senior scientists, who have been properly trained to use this platform, or by scientists who are assisted by a trained specialist.
Anke Becker has remarkable experience in automation processes. Her professional background in genetics, botany and microbiology is complemented by her interest and engagement in computer sciences and robotics. After her PhD and habilitation in the field of prokaryote genetics she was involved in the DFG-funded Bioinformatics Initiative and the establishment of Bachelor and Master programs in Bioinformatics, Genome Research and Systems Biology at Bielefeld University.

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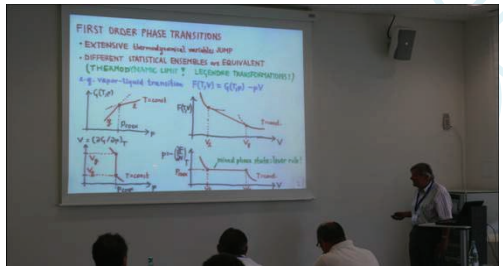
ALBERT-LUDWIGS-UNIVERSITÄT FREIBURG

Report on the 1st Black Forest Focus on Soft Matter workshop, held from July 7th to 11th 2009

On July 7th about 30 international scientists convened at FRIAS to discuss different aspects of Computational Methods for the field of Soft Matter Research.
The workshop began with an informal get-together on the evening of the 7th and was followed by three days of lectures. The diverse scientific programme covered a broad range of topics in both classical and quantum statistical physics, ranging from micro- and mesoscopic simulation techniques for complex systems, to a variety of applications involving quantum transport, electron transfer, calcium signalling, energy flow in biological systems.
Kurt Binder, a world leading pioneer of Monte-Carlo methods, opened the workshop with colourful hand-painted slides and the side-remark that he does not trust Microsoft - a remarkable presentation. The second day's topics covered biomolecular aspects of the field and was followed by an excursion to the Atomkeller in Haigerloch, where Junior Fellow Michael Thorwart gave a guided tour through the museum.



On Friday Uzi Landman – a respected forerunner of computational physics – demonstrated with his simulations of drop-breaking behaviour that a skilled speaker is very well able to keep an audience´s attention at 9 o'clock in the morning – even after an excursion and an extended evening programme on the previous day. >

The last day of the workshop disproved normal practice and was a pleasant surprise for the organizers – the participants stayed until the

end of the event, in order to follow the presentations on continuum and mesoscopic particle models for microfluidics, quantum transport, multiscale methods and lattice Boltzmann simulations of soft materials.

TO COME

The overall positive feed-back of speakers and participants encouraged the organizers to proceed with the planning of the Black Forest Focus on Soft Matter Series:

October 22-24, 2009
2nd Black Forest Focus on Soft Matter on **Quantum Efficiency**, to be held in the Hotel Brugger – this time true to the name, in the midst of the Black Forest!

June 3-5, 2010
3rd Black Forest Focus on Soft Matter on **Frontiers in Dynamics - from Random to Quantum Walks**, location to be announced.

July 21- 23, 2010
4th Black Forest Focus on **Soft Matter Micro- and Nanofabrication**, to be held in the Hotel Saigerhöh.

(*more Information: www.frias.uni-freiburg.de /bff*)

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Project description of Michael Krische

On Monday July 13th Professor Michael Krische discussed the driving force and outcome of his FRIAS project which he conducted here in Freiburg during the last months.
In his presentation Michael Krische gave an overview of the great chemical process inventions of the last two centuries. These include the Haber-Bosch process and the Fischer-Tropsch reaction.

In his eyes the chemical industry has helped mankind a lot, however, it has also produced rather unwelcome byproducts. Many synthesis processes create a lot of waste and the more complicated the end product is (e.g. pharmaceutical drugs), the more reaction steps are needed, the greater the waste.

Michael Krische's approach over the last years has been to simplify these reactions and to perform reactions such as Hydrogen Mediated C-C Bond Formation, Nucleophilic Catalysis via Phosphine Conjugate Addition, Metal-Catalysed/Anion Radical Cycloaddition and Ctalytic Conjugate Additio-Electrophilic Trapping.

Michael ended his presentation with some impressions of Texas, showing the audience that Texas is more than just cowboys, Bush Jr. and desert, and that, in contrast, the eastern part is a beautiful place with forests and lakes – in short, a nice place to live and a good environment for scientists. After three months away from Texas, Michael apparently is looking forward to getting back to his family!

PRIZES 2009

Nicolas Vautravers received an Alexander von Humboldt Foundation Research Fellowship 2009.

Sebastian Weber is awarded the Research Prize 2009 of the Gerhard Herzberg Gesellschaft for his dissertation.

Junior Fellow Aurelio Mateo-Alonso will receive the Eugen-Graetz-Preis on October 21st, 2009.

TO COME

October 28, 2009
Hermann Staudinger Lecture
Nobel Laureate Brian D. Josephson:

"A Biological Approach to Fundamental Reality", (*more Information: www.frias.uni-freiburg.de/hsl*)

Chemistry lecture hall at 4:15 p.m.

February 25-27, 2010
Macromolecular Colloquium in Freiburg: Symposium on Bioinspired Macromolecular Chemistry organized jointly by the Institute for Macromolecular Chemistry and the Freiburg Institute for Advanced Studies (FRIAS).

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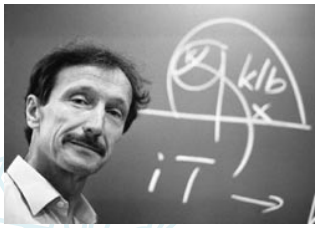
In 1999 she established the transcriptomics and robotics section which in 2003 became part of the newly founded Institute for Genome Research and Systems Biology at the Center for Biotechnology (CeBiTec), Bielefeld University. In 2008 she was appointed a professor at the biology department, Freiburg University, where she quickly established collaborations in different institutes. Her membership at the ZBSA furthermore leads to a tight network with scientists at the medical, technical and physicsfaculties.
Professor Becker reported that the use of this new automation platform will be advantageous for mega-assays only, where thousands of products are to be screened simultaneously, or for interlaced, highly complicated assays, where many parameters are investigated in a series of varying conditions. For all other experiments the time and energy spent for programming would not validate the use of the robot – manual pipetting would simply be more efficient for smaller scale assays.
Thus, this automated platform will be very helpful for the experiments of the LIFENET Senior and Junior fellows who are all working on projects related to the investigation of complex cellular systems. This platform makes labor-intensive and complex experimental approaches – either genetics, biochemical or proteomics related - possible and may prove to be one of the components that is of great advantage to Freiburg in this field.

TO COME

October 16, 2009
Joint Symposium of FRIAS LIFENET and Dermatology: Epidermolysis bullosa Network (EB Network) International Kindler Syndrome Network (Kindlernet) on "Rare Skin Diseases - a systemic approach" at the Center for Biological Systems Analysis (ZBSA)
(*more Information: www.frias.uni-freiburg.de//lifenet/veranstaltungen*)

December 4-5, 2009
International Symposium "Structure and Function of Synapses" organized by Internal Senior Fellow Peter Jonas.
(*more Information: www.frias.uni-freiburg.de/lifenet/veranstaltungen*)

December 10, 2009
Hermann Staudinger Lecture
Nobel Laureate Rolf Zinkernagel:



"Experiments with Surprises". (*more Information: www.frias.uni-freiburg.de/hsl*) Aula at 4:15 p.m.

June 3-5, 2010
The 3rd Conference on Systems Biology of Mammalian Cells (SBMC 2010) continues a series of conferences organized by Internal Senior Fellow Jens Timmer (chair of the conference), Johannes Bausch, Steven Dooley, Hermann-Georg Holzhütter, Steffen Klamt, Ursula Klingmüller, Jens Reich, Uli Zanger. The first two meetings were held in Heidelberg 2006 and in Dresden 2008.
(*more Information: www.sbmc2010.de*)

June 22, 2010
Hermann Staudinger Lecture

Nobel Laureate Aaron Ciechanover.
(*more Information: www.frias.uni-freiburg.de /hsl*)

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