3rd FEBS Advanced Lecture Course on
Systems Biology:
From Molecules to Function

Alpbach, Austria, EU, March 7-13, 2009

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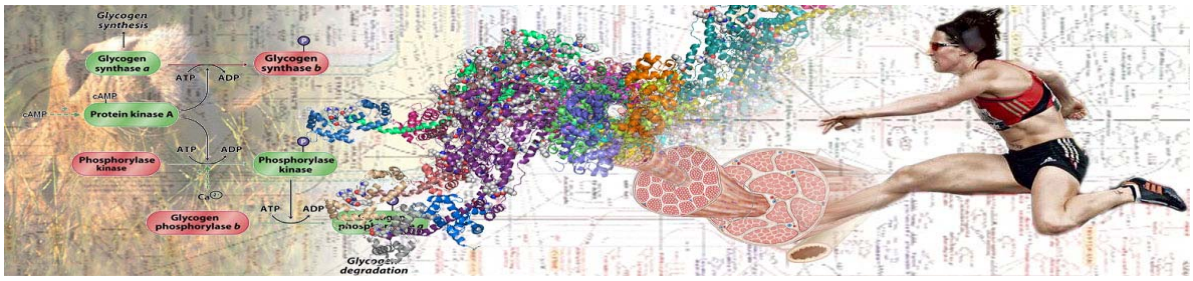

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Ruedi Aebersold
Philippe Bastiaens
Richard Adams
Gerold Baier
Philippe Bastiaen
Jean Beggs
Sebastian Bohl
Roger Brent
Carsten Carlberg
David de Graaf
David Fell
Carole Goble
Igor Goryanin
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Organizing institutions

Main Organizer:

FEBS: FEBS-SysBio2009, the 3rd Advanced Lecture Course on Systems Biology was organized on behalf of FEBS, the Federation of European Biochemical Societies.

Co-organizing networks from the EC-FP6 programme:

BioSim: A Network of Excellence for BioSimulation

EnFin: Experimental Network for Functional Integration

NucSys: A Marie Curie Training Network entitled *"Systems biology of nuclear receptors: a nutrigenomic approach to aging-related diseases"*

Co-organizing organizations (including Workshop on PhD training)

Bundesministerium für Bildung und Forschung

Biotechnology and Biological Sciences Research Council

ERASysBio

FEBS-SysBio2009 was supported by

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Willkommen in Alpbach, Welkom in Alpbach, Welcome to Alpbach!

We heartily welcome you to the third FEBS Advanced Lecture Course on Systems Biology. It is now fourteen years ago that the first sequences of entire genomes were published and these fourteen years have revolutionized the Life Sciences. The first sequenced genomes stemmed from simple Life forms, but genomics quickly progressed to the larger human genome. Now genome sequences are available for many, many organisms throughout the three Kingdoms of Life. It was perhaps surprising that the human genome sequence was less than ten times larger than that of the humble intestinal bacterium *E. coli*. Indeed, the genomes of organisms that had always been thought to be 'simple' model organisms range in the thousands of genes. The smallest genome that appears sufficient to inform Life contains more than 300 genes. Apparently these 300 genes need each other for their persistence in an organism; just having 100 organisms of three genes each, appears not to be compatible with Life as we know it.

Life as we know it appears to be of an irreducible complexity therefore. This is understandable from the first principles of biochemistry: The significant chemical conversions that degraded sugar molecules are most readily executed in series of steps (pathways). Each step needs to be catalyzed by a protein. All proteins need to be kept together by a membrane, which requires protein-based specific transport systems and lipid biosynthesis. The information of the amino-acid sequence of all proteins needs to be stored. To drive many of these essential activities Gibbs free energy is needed. Proteins consist of amino acids, many of which need to be synthesized from simpler components. The essence of these first principles is not so much that many processes are needed, but that a rather significant number of processes are needed *together*: There is no enzyme catalyzed metabolic pathway without a membrane; no membrane without a metabolic pathway for lipid synthesis; no lipid biosynthesis without ATP to drive it; no ATP without catabolism etc.

Accordingly, Life itself is an emergent property, as it depends critically on the interaction of its components. The other side of the same coin is that the components of Life are not autonomous; for their functioning and maintenance they need the living organism as a whole. This whole depends on the interactions of the parts as well as on the parts themselves and the parts depend on the whole and the interactions with the other parts. This gets us very close to the definition of Systems Biology, which (in a consensus view)[1] is the Science that studies how biological function arises in the interactions between components of living systems.

The emergence of new properties from interactions requires these interactions to be 'nonlinear', where 'nonlinear' may refer to a number of different aspects. These include: (i) nonlinearity of rate equations, (ii) heterogeneity ('organization') in time (time hierarchies), space (compartmentation) and chemistry (*e.g.* the mRNA-protein-metabolism hierarchy), (iii) cooperative binding, and (iv) stochasticity. The space-time aspects will be the focus of the course's Symposium **Space-Time**. When interactions are nonlinear, their strengths depend on the operating point and so does the emergence of new properties. Consequently, once needs to be precise, both in experimentation and in analysis, and one needs to study the system under physiological conditions. In addition, interactions between two components may well depend on other components. Potentially one therefore needs to consider all the components of the system.

[1] Alberghina L. & Westerhoff H.V. (Editors) (2005) Systems Biology: perspectives and definitions, Springer

The above explains why many Systems Biologists implement quantitative experimentation, use mathematical approaches to analyze their data or model their system, or engage in genome wide analyses. The quantitative molecular experimentation under conditions that are relevant for the *in vivo* situation is relatively new to Biology. Existing experimental methods are being fine-tuned to these new tasks and new methods are developed. The same goes for mathematical methodologies, which used to target the simpler linear systems or to approximate nonlinear systems by linear ones, but should now be deployed in the nonlinear systems without too much linearization. This Advanced Lecture Course on Systems Biology therefore contains an entire Symposium on **F**oundations. This symposium was organized together with the European Network of Excellence on BioSimulation (BioSim), which is developing and applying various types of modeling with an emphasis on Systems Biology in the context of disease and drug therapy (http://biosim.fysik.dtu.dk:8080/biosim/).

Some think of Biology as a 'can of worms', or a set of special cases sharing little if any, regularity. By now, we know that this is not true. All Life appears to have the DNA, mRNA, protein, metabolism hierarchy of information; a democratic hierarchy, but a hierarchy. Virtually all processes in living organisms are catalyzed by proteins. Free-energy and redox equivalents shuttle between metabolic pathways through ATP/ADP and by NADH/NAD coenzymes, with minor variations (NADP, protons). The thought that Biology is *stamp collecting* and that physics is … Physics, appears to be further away from the truth than anticipated. After all, Newton's law only works *in vacuo* and at low speeds of matter, and the electric potential away from a point charge only follows Coulomb's law when there is a steady homogeneously polarizable medium around that point charge, which is rarely the case. It is indeed exciting to identify what most Biologists have come to accept as truths, as empirical laws. These may often be derived from underlying principles of organization: it is a challenge to recognize principles, or even 'laws' of Systems Biology. Metabolic Control Analysis and network topology analyses have suggested some of these. In the former case the laws can be deduced from underlying conditions met by most realistic networks. In the latter case most laws have remained empirical until now, but who knows…; this is why we are here. At any rate, the Symposium on **P**roofs of the **P**udding will offer ample opportunity to learn about and discuss these academic aspects of Systems Biology.

Function emerges from interactions at many organizational levels in Biology. If one is strict, perhaps too strict, then Biological function is only meaningful in the context of Life, hence at least in the context of unicellular organisms. In this way of defining biological function, it is something that evolution could directly select for. Molecular 'functions' cannot themselves be selected for. There is no selfish gene, or not more so than a selfish membrane surrounding it. Molecular functions can only be selected for if they exercise some control over the functioning of the intact organism. Above the level of the individual cell there are many functions that can be selected for, *i.e.,* anywhere where the Genomes is alive. At this course we shall discuss the Live Genome in the symposium the **G**enome alive. This topic is of major interest for the Marie Curie Training network on Nuclear receptor Systems Biology (NucSys).

Systems Biology is up and running in the more enlightened countries, notably Japan, USA, Germany, the United Kingdom and Switzerland, and in the EU as such. The German *Bundesministerium für Bildung und Forschung* (BMBF) has catapulted Germany into Systems Biology by daring to focus on a highly ambitious project, i.e. Hepatosys; the Systems Biology of the liver cell. This is running now and it is most impressive how in many parts of this program experimental and theoretical groups are interacting. This will become clear at this course too, with many contributions coming from Hepatosys. The BMBF is an enthusiastic sponsor of this course. More recently Germany has again been active in sponsoring systems biology, both in terms of centers of excellence (ForSys) and in terms of funding Systems Biology research proposals for various areas (through a Helmholtz initiative). The United Kingdom's Biotechnology and Biological Sciences Research Council (BBSRC) has also become quite active in funding Systems Biology. In fact Systems Biology is the *Leitmotiv* of BBSRC's ten year plan. BBSRC with EPSRC has been funding 6 Centers of excellence for Systems Biology, and BBSRC has funded a number of large systems biology projects (through its SABRE initiative). EPSRC and BBSRC have funded three doctoral training centers for Systems Biology. Manchester is home to both such a research centre and a training centre (MCISB and its DTC-

ISBML, which are both involved in the organization of this course). Indeed it is a pleasure to see that the FEBS advanced course is now turning into a meeting place for the emerging human capital that populates these major new Systems Biology programs.

There was Systems Biology *avant la lettre*, or there have been two roots of the topic[2]. Mathematical Biology was (and is) one of these roots. It foresaw the complexity of Biology and the emergence of biological function in nonlinear processes, but it lacked the realism of molecular biology. The studies of the mechanisms of development and differentiation through partial or complete self-organization are important examples. Molecular biology, biophysics, genomics and functional genomics are all aspects of the second, perhaps dominant root of Systems Biology. The opening lectures have been organized in collaboration with one of the many pharmaceutical companies that take Systems Biology very seriously, i.e. AstraZeneca, and with the ERAnet ERASysBio and the BBSRC. The latter is a transnational organization of funding organizations from a variety of European countries, supported by the EU's framework program 7. These opening lectures point out why biologists could not be expected to solve the problems of Life (nor could physicists), why it is not always obvious how Systems Biology could serve the industry, and how feedback (i.e. interactions) are essential for decision making, in Life.

Funding for Systems Biology is increasing rapidly. Consequently also Systems Biologists are in high demand. Unfortunately there are few true Systems Biologists around. Indeed, science education has been focusing on single disciplines like Molecular Biology without Mathematics, or on Mathematics or Physics without Biology. In addition, Systems Biology requires so much knowledge about so many disciplines that it is hard for any individual to excel in all that are needed. Therewith Systems Biologists should not only be excellent in some aspect of the field but also be able to grasp other aspects quite rapidly and to engage in fruitful collaborations with Systems Biologists who are experts on other aspects. Interdisciplinarity, which refers to being in between traditional disciplines, should be paired with transdisciplinarity, *i.e.* the ability to combine aspects from across disciplines. This may require entirely new modes of training of beginning scientists. Various countries have begun to set up such novel training and among these the United Kingdom has been rather explicit by its EPSRC and BBSRC funding three Doctoral Training Centers of this type (of which one supports the organization of this course: http://www.mcisb.org/dtc/). New generations of Biology and Physics students are now emerging with capabilities that are different between the individuals, but also with the ability to 'twin' their research with others. These generations realize that the expertise in Systems Biology is not confined to the institutes or training centers they are in and that the most exciting topics of research aren't either. They wish to extend their training to other Systems Biology groups and topics, on this same planet. Part of training in Systems Biology should therefore be international and we are pleased that the Federation of European Biochemical Societies (FEBS) is highly supportive of this point of view. We appreciate the strong support from the FEBS Advanced Course Committee**,** which decided to continue this FEBS Advanced Lecture Course after its successful initiation in 2005 (http://www.febssysbio.net/index2005.html) with enthusiasm of the previous chairman of the committee Karel Wirtz. The enthusiasm is now so high that indeed one of the organizers of this course is the Chair of the FEBS Advanced Course committee (Karl Kuchler). We should like to thank the members of this committee as well as Iain Mowbray for their continued support.

That training is an important issue is also demonstrated by the fact that FEBSSysBio2009 is twinned with a workshop on how training for PhD´s in systems biology should be formatted. This is the ERASysBio workshop on European Standards for PhD-training in systems biology The workshop is integrated into the first part of the course, with the common lecture by Yuri Lazebnik pinpointing the need of entirely new approaches to biology.

The need for training is also recognized by the national European organizations that fund modern biological and medical research. Indeed, the German Ministry for Education and

[2] Westerhoff H.V. & Palsson B.O. (2005) Nature Biotechnol. 22, 1249 – 1252. The evolution of molecular biology into Systems Biology

Research (BMBF) has generously supported the course largely through student registration waivers. The Framework Programs of the European Union has been actively supporting the development of Systems Biology, in a number of network-like activities. Quite a few of these have supported this course by helping in the organization and supporting their students to come to the course and (BioSim, UNICELLSYS, NucSys, YSBN, EC-MOAN, ENFIN) by supporting the corresponding lectures and training activities.

The number of new drugs that reach the market, and the number that survive, is diminishing. The cost of developing the drugs is becoming astronomical, largely because it is too difficult to choose between the large numbers of promising drug leads at an early stage. The ones that are plagued by 'side effects' and will not interact optimally with their target in the context of the living organism, are identified so late in the process that they absorb most of the budget. The critical issues here are again Systems Biology issues, and modern pharmaceutical companies are engaging strongly in this new field.
It is unbelievable how ill-defined some of the food is that we enjoy on a daily basis. Both in terms of food safety, and in terms of improvements in the contribution of food to health, food production methodology is a field that may also be inspired by Systems Biology developments. The same goes for the production of fine chemicals by living organisms. The cosmetics industry has always been on the brink of suspicion that their products might not deliver what the glossy journals claim, *i.e.* eternal youth. Some of the applications of Systems Biology will be discussed in the symposium Making Systems Work.
The FEBS Journal has been a pillar under Biochemistry and Molecular Biology in more than one way. First, it has always published scientific articles of high quality and significance. Second, it has always earned much of the money that is used to subsidize FEBS courses. The journal invites the participants to the course to submit expressions of interest for writing minireview articles for the journal (you may wish to contact their System Biology editor Ursula Kummer).

Europe already has a number of Centers for Systems Biology. Of these, Systems X**,** the Manchester Centre for Integrative Systems Biology, its Doctoral Training Centre DTC-ISBML**,** and the Netherlands Institute for Systems Biology are among those that support this course intensively.

Of course, the home institutions of the organizers have contributed rather importantly to the organization, i.e. the Free University in Amsterdam, the University of Manchester, the Max F. Perutz Laboratories of the Vienna Biocentre, the Institute for Molecular Systems Biology of the ETH Zürich, the University of Stellenbosch, and the Humboldt University in Berlin. Likewise the Teachers of the course (i.e. the Lecturers and the members of the Scientific Advisory Board**,** see above**)** have spent quite some time in order to optimize their teaching at this course; their institutes have thereby also contributed.

A course is a matter of human beings, much more than of institutions. This course is possible thanks to the enthusiasm of the many people involved in the actual organization. The local organizing committee is quite important: we thank the team with colleagues from Amsterdam, Manchester, Stellenbosch, Vienna and Zürich for their enthusiasm and efforts**:** Alexey Kolodkin**,** Jan Berkhout, Brett Olivier, Neil Swainston, Anne Schwabe, Martijn Moné, Florian Rudroff, Cornelia Klein, Martin Valachovic, Maciej Swat and others. Ms Eva Wille of the congress centres and her collagues have been very efficient in getting everything organized. And we thank Emilia, once again our youngest course participant, for her help in so many ways.

But of course, we should not forget the all-but-silent majority, i.e. the participants and their supporters (institutions and mentors), who contributed much effort and inspiration. Reading the abstracts we found that a great many innovative ideas were going to be contributed by the participants *in spe*. This course is perhaps the third of its kind in Systems Biology. We have to admit that although our speakers/teachers are excellent Systems Biologists, we have not been able to get all excellent Systems Biologist to the course: we had too few speaker slots.

What is next? An exciting course here in Alpbach with lots of excellent teaching. The teaching program is special in that it hosts a number of unconventional teaching elements. The latter include the systematic discussion of *each* poster contribution by a number of senior scientists, black-board teaching, power-poster presentations, discussion sessions formulating key questions and subsequent sessions trying to address these. The lectures are also special in that some of them are explicitly didactic. All of them have an add-on of informal discussion of methodology with a smaller group of students. Most of them are also split into a methodological part and a part with the most recent results. Equally importantly, new and more established Systems Biologists from various science directions will meet and discuss science intensively.

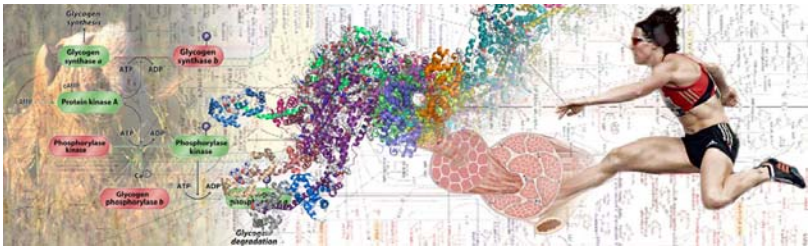
What will be? We expect that Alpbach, known for being a cradle for innovative politics, will now become a cradle of a network of excellent Systems Biologists who will know to find each other in the future for advice and collaboration. We hope that the interdisciplinary activities that are so important for Systems Biology, will take off and make excellent new Science.

The organizers,

Anneke

and her team

(i.e., Frank Bruggeman, Walter Glaser, Regina Klaus, Edda Klipp, Karl Kuchler, Ursula Kummer, Uwe Sauer, Jacky Snoep, and Hans V. Westerhoff)



Scientific Program - its principles

Symposia

The course has been organized in terms of **5 Symposia,** dedicated to areas within Systems Biology, *i.e.* '**Systems Biology in Space and time', Foundations for Systems Biology', the Proof of the Pudding, the Genome alive,** and **making Systems Work.** Each symposium has its dedicated day, consisting of a morning, the later part of the afternoon and parts of three evening sessions dedicated to teaching around the posters.
In the afternoon, there will be black board and computer sessions. Discussions and short talks by invited principal Investigators and students follow. The posters corresponding to the symposium have been grouped together physically but will be presented in sequel on the three poster evenings (Sunday, Monday and Wednesday).

Symposia Morning: Lectures (L), tutorials and an issues identifying discussion

Mornings have didactic lectures, topical lectures (all with an additional tutorial) and the Results lectures. At the end of the morning session the Chair of the symposium will summarize the morning session and elicit a general discussion between students and speakers where they will identify issues that are most exciting in the particular area of Systems Biology addressed by the Symposium.
Wednesday will witness an important debate about where to go; will we or will we not be able get our act together and dare go for a new adventure: the silicon, or the virtual physiological, human? We may add a few notes to the Yokohama, Tokyo and Amsterdam declarations. But by and large, there is no way stopping Biology from becoming a quantitative science and physics from addressing Life.

Break for Lunch, Physical Activities, Tea

Except for Saturday and Tuesday, lunch and dinner will be in Hotel Alpbach, a 100 metres up the road from the Congress Centre. Course teachers are requested **not** to seat together. They should rather sit at their own table and be joined by students. Similarly, students are kindly requested **not** to sit together with other students from their own institute, but with Teachers, or with students and principal investigators from other institutes.
After lunch there is a break for physical activities, such as skiing, rock climbing, chess, or hang gliding. You may also take a lunch bag rather than engage in a seated lunch and engage in scientific discussions on gravity in the ski-lift or when gliding down the slopes. We are sure that you may be spotting some of the teachers up there and you may be able to reciprocate in teaching them how to ski! Be back for tea (coffee if you wish) shortly after 16h00 though, to engage in the afternoon session, which begins at 16h30.

Black-Board Teaching (BB)

On Sunday, and Monday, Blackboard Teaching courses will be held in parallel in two sessions after the physical activity break and tea, one from 16h30 until 17h15 and one from 17h20 until 18h05. These are optimized for interactive teaching. Key concepts for Systems Biology will be explained, in interactive mode, using blackboard and chalk, or equivalent. 5 Blackboard courses/Computer practicals will be held in parallel, such that each should be expected to host some 25 students. A Black Board course is typically taught by a teacher for three days on end, the total teaching taking 130 minutes, extending over three 45 minutes sessions. The student should therefore choose beforehand which two Black Board (or computer practical) courses (s)he will wish to follow. Switching between topics will mean that the student will have missed the important introductory parts of the course.

The following topics will be taught in this mode:

- An introduction to Metabolic Control Analysis – theory and applications (D. Fell)
- Systems physiology (Jeroen Jeneson and Natal van Riel)
- Everything about metabolism (Matthias Heinemann)
- Vertical genomics: the how and why of regulation (Douwe Molenaar)
- Flux balance analysis (Bas Teusink)

Computer practicals (CP)

On Sunday, and Monday afternoon and on Wednesday morning, five Computer practical courses will be run. Like Blackboard Teaching courses these are optimized for interactive teaching, with the difference that the students will be taught to use systems Biology computing facilities, such as CoPaSi, Edinburgh Pathway Editor, and JWS Online/Silicon Cell. Key concepts for Systems Biology will be explained, in interactive mode, using the computers that will be made available, or laptops brought by the students. The students should therefore choose beforehand which two computer (or Black Board) courses (s)he will wish to follow. Switching between topics will mean that the student will have missed the important introductory parts.

The following topics will be taught in this mode:

- Edinburgh Pathway Editor and SBSIVisual - tools for analysing and visualizing biological pathways (Richard Adams and Igor Goryanin)
- Model building, parameter estimation and Identifiability analysis (M.Schilling & S.Bohl)
- Modelling in cell biology (F. Bruggeman, A. Kolodkin, E. Rybakova and B. Olivier)
- Introduction to modelling (Ursula Kummer)
- Data management using Taverna, JWS Online and SABIO-RK; hands on computer tutorials linking experimental data to model interpretation using workflows (K.Wolstencroft, O. Krebs, N. Swainston, C. Goble and J. Snoep)

Symposia afternoon: Short Talks (S)

A number of students and Principal Investigators have been invited to give a brief oral presentation about recent discoveries and developments (10 + 5 minutes)

Symposia late afternoon discussion

During the late-afternoon discussion, the issues raised at the end of the morning discussion session will be addressed by the Lecturers and other Teachers of that symposium. This will be followed by a general discussion.

Poster Presentations (P), Poster Committees, Analyses, Discussions

The posters are up throughout the meeting in Liechtenstein and the Von Hayek Halls; they should be mounted before Sunday evening and removed Thursday evening.
Each poster will be presented for at least an hour by its prime author, as indicated in the program: Poster numbers *3n-2* will be presented and discussed Sunday evening from 21h00 for at least an hour. Numbers *3n-1* will be similarly presented and discussed Monday evening. Numbers *3n-3* will be presented and discussed Wednesday evening. The presenters of short talks are requested to present their poster (also) on the day of their short talk.
Authors presenting posters are asked to indicate on their poster additional times when they will be available at their poster for discussion.
At other times during poster sessions the poster authors are supposed to discuss the posters of their colleagues.
Every student will get to speak with the teachers in her/his symposium: each symposium has a corresponding Poster Committee, which consists of all lecturers at that symposium plus:

- Symposium **S**pace and Time: Timmer (chair) plus S lecturers
- Symposium **F**oundations: Klipp (chair) plus F lecturers
- Symposium **P**roof of the Pudding: Sauer (chair) plus P lecturers
- Symposium **G**enome alive: Bruggeman (chair) plus G lecturers
- Symposium Making Systems **W**ork: Kummer (chair) plus W lecturers

During the first 45 minutes of each of the three poster sessions, this committee will inspect the one third of the posters belonging to their symposium that is being presented by their author that evening (i.e. up to ten posters). At the end of the poster session, i.e. from 22h30 – 23h00), i.e. in the 'poster round table discussion', the poster committee will discuss in a session with all poster presenters of their symposium all the posters they have seen that evening (*i.e.* this will be a self-organizing (drinks provided by the Course committee) non-plenary session with approximately 4 committee members and 10 poster presenters).
Please note that for each symposium, posters will be discussed Sunday, Monday *and* Wednesday evening. Each poster presenter will only present during the early half of one of these evenings and then be in a discussion groups later that evening.

Participant Task List: Contribution of each Participant and its Timing

Full Name	Day	Contribution Number	Type of Contribution
Jure Acimovic	Sunday	G-P01	Poster
Małgorzata Adamczyk	Monday	G-P02	Poster
Richard Adams	Su, Mo, Wed.	CP-01	Comp. Prac.
Ruedi Aebersold	Tuesday	PL-04	Lecture
Assim Alfadda	Sunday	W-P01	Poster
Yusur Al-Nuaimi	Sunday	P-P01	Poster
S. Andreas Angermayr	Wednesday	G-P03	Poster
Emily Armitage	Monday	P-P02	Poster
Katja Astikainen	Sunday	F-P01	Poster
Mohammed I. Atari	Monday/Monday	F-S03/F-P02	Short-talk/Poster
Ima Avalos Vizcarra	Wednesday	F-P03	Poster
Gerold Baier	Thursday	W-L04	Lecture
Lisa Bartoli	Sunday	F-P04	Poster
Jean Beggs	Tuesday	PL-02	Lecture
Uwe Benary	Sunday	S-P01	Poster
Jan Berkhout	Monday	S-P02	Poster
Marta Biasiolo	Sunday	G-P04	Poster
Sebastian Bohl	Su, Mo, Wed.	CP-02	Comp. Prac.
Christian Bölling	Wednesday	S-P03	Poster
Roger Brent	Monday	FL-03	Short talk
Matteo Brilli	Monday	F-P05	Poster
Anneke Bruemmer	Monday	G-P05	Poster
Frank Bruggeman	Su, Mo, Wed.	CP-03	Comp. Prac.
	Monday	G-L03	Debate
Carsten Carlberg	Saturday	T-07	Lecture
	Monday	FL-01	Short talk
Darko Čerepnalkoski	Sunday	S-P04	Poster
Stephen Checkley	Wednesday	P-P03	Poster
Alessandro Coppe	Wednesday	G-P06	Poster
Michael Elgart	Sunday	G-P07	Poster
Laura Elo	Sunday	P-P04	Poster
Ayman Elshayeb	Monday	G-P08	Poster
Gokhan Ertaylan	Monday	S-P05	Poster
Muhammed Ali Faisal	Wednesday/Sunday	S-P06/S-S02	Poster/Short-talk
Sam Farrell	Monday	P-P05	Poster
David Fell	Saturday	ML-01	Prep. M-course
	Su, Mo, Wed.	BB-01	Black Board

Philip Fowler	Sunday	S-P07	Poster
Michaela Clare Freeland	Wednesday	G-P09	Poster
Rodolfo Garcia-Contreras	Monday	S-P08	Poster
Suzanne Geenen	Wednesday	P-P06	Poster
Walter Glaser	all days		organisation
Carole Goble	Su, Mo, Wed.	CP-05	Comp. Prac.
	Monday	FL-02	Short talk
Anisha Goel	Monday	W-P02	Poster
Marc Goodfellow	Wednesday	S-P09	Poster
Igor Goryanin	Su, Mo, Wed.	CP-01	Comp. Prac.
	Tuesday	PL-02	Lecture
David de Graaf	Thursday	WL-02	Lecture
Marc Hafner	Wednesday	F-P06	Poster
Mateja Hafner	Wednesday	W-P03	Poster
Ines Heiland	Sunday/Monday	P-P07/P-S01	Poster/Short-talk
Matthias Heinemann	Su, Mo, Wed.	BB-03	Black Board
Markus Heinonen	Sunday	F-P07	Poster
Adriano Henney	Monday	G-L03	Debate
Stefanie Hertel	Monday	F-P08	Poster
Stefan Hohmann	Tuesday	PL-01	Lecture
Victoria Jackson	Wednesday	F-P09	Poster
Jeroen Jeneson	Su, Mo, Wed.	BB-02	Black Board
Daniel Kahn	Sunday/Monday	G-P10/G-S02	Poster/Short-talk
Despoina Kaloriti	Monday	P-P08	Poster
Guy Karlebach	Monday	G-P11	Poster
Daniel Kaschek	Sunday	W-P04	Poster
Ruian Ke	Wednesday	G-P12	Poster
Edward Kent	Sunday	S-P10	Poster
Boris Kholodenko	Sunday	SL-02	Lecture
Regina Klaus	all days		organisation
Cornelia Klein	all days		organisation
Ursula Klingmüller	Saturday	CL-02/03	Prep. C-course
Edda Klipp	Tuesday	PL-01	Lecture
Dragi Kocev	Monday	W-P05	Poster
Bente Kofahl	Wednesday	P-P09	Poster
Alexey Kolodkin	Mo/Su, Mo, Wed.	S-P11/CP-03	Poster/Comp. Prac.
Tamas Korcsmaros	Sunday	G-P13	Poster
Anja Korencic	Sunday	F-P10	Poster
Anneke Koster	all days		organisation
Helen Laura Kotze	Wednesday	S-P12	Poster
Olga Krebs	Su, Mo, Wed.	CP-05	Comp. Prac.
Laxmi Krishnappa	Monday	F-P11	Poster
Karl Kuchler	Saturday	T-06	Lecture
Ursula Kummer	Saturday	T-04	Lecture

	Su, Mo, Wed.	CP-04	Comp. Prac.
Douglas Lauffenburger	Saturday	T-05	Lecture
	Sunday	SL-03	Lecture
Yuri Lazebnik	Saturday	OL-01	Lecture
Sang Yup Lee	Thursday	WL-03	Lecture
Chunguang Liang	Sunday	P-P10	Poster
Louise Maddison	Wednesday	W-P06	Poster
Maria Mateescu	Sunday	W-P07	Poster
Barry McColl	Monday	W-P08	Poster
Femke I. C. Mensonides	Monday	P-P11	Poster
Carsten Mente	Sunday	S-P13	Poster
Hanan Messiha	Wednesday	P-P12	Poster
Hans W. Mewes	Wednesday/Monday	F-P12/F-S01	Poster/Short-talk
Marcel Mischnik	Monday	S-P14	Poster
Louise Mølgaard	Wednesday	W-P09	Poster
Douwe Molenaar	Su, Mo, Wed.	BB-04	Black Board
Martijn J. Moné	Wednesday	S-P15	Poster
Simon Moon	Sunday	F-P13	Poster
Erik Mosekilde	Monday	G-L03	Debate
Minca Mramor	Sunday/Thursday	W-P10/W-S02	Poster/Short-talk
Stephanie Müller	Monday	F-P14	Poster
Maria Nardelli	Saturday	CL-01	Prep. C-course
Sayantan Nath	Sunday	S-P16	Poster
Jana Nemcova	Wednesday	F-P15	Poster
Denis Noble	Monday	G-L03	Debate
Bela Novak	Saturday	OL-03	Lecture
Brett G. Olivier	Monday	W-P11	Poster
Olusegun James Oshota	Sunday	P-P13	Poster
Pinar Ozturk	Wednesday	W-P12	Poster
Shanmukha S. Padmanabuni	Sunday	F-P16	Poster
Caroline Paget	Monday	F-P17	Poster
Wei Pang	Monday	P-P14	Poster
Marta Papini	Sunday	W-P13	Poster
Siavash Partow	Monday	W-P14	Poster
Gabriela Pastori	Saturday	T-01	Lecture
Gerald P. Penkler	Wednesday/Thursday	P-P15/P-S02	Poster/Short-talk
Michael Pereira	Monday	G-P14	Poster
Ralph Pethica	Wednesday	G-P15	Poster
Angela M. M. O. Pisco	Wednesday	F-P18	Poster
Mark Quinton-Tulloch	Sunday	P-P16	Poster
Ahmed Rattani	Monday	S-P17	Poster
Andreas Raue	Sunday	F-P19	Poster
Armando Reyes Palomares	Sunday	G-P16	Poster

Natal van Riel	Su, Mo, Wed.	BB-02	Black Board
Sanjit Roopra	Wednesday	W-P15	Poster
Michael Rosefield	Sunday	S-P19	Poster
Fabian Rost	Monday	S-P20	Poster
Florian Rudroff	all days		organisation
Katja N. Rybakova	Monday/Sunday	G-P17/G-S01	Poster/Short-talk
	Su, Mo, Wed.	CP-03	
Uwe Sauer	all days		organisation
Gionata Scalcinati	Sunday	W-P16	Poster
Marcel Schilling	Su, Mo, Wed.	CP-02	Comp. Prac.
Joep P.J. Schmitz	Monday	P-P17	Poster
Annette Schneider	Monday	F-P20	Poster
Juliane Caroline Schulz	Monday	W-P17	Poster
Edda Schulz	Wednesday	S-P18	Poster
Anne Schwabe	Wednesday	G-P18	Poster
Luiza Seeliger	Wednesday	P-P18	Poster
Luis Serrano	Tuesday	PL-03	Lecture
Mohammed Shahraz	Wednesday	S-P21	Poster
Bin She	Sunday	S-P22	Poster
Nicholas Shipillis	Wednesday	W-P18	Poster
Evangelos Simeonidis	Sunday	P-P19	Poster
Ivica Slavkov	Sunday	W-P19	Poster
Ben G. Small	Monday	P-P20	Poster
Jacky Snoep	Su, Mo, Wed.	CP-05	Comp. Prac.
Oksana Sorokina	Sunday	G-P19	Poster
Albert Sorribas	Wednesday/Monday	F-P21/F-S02	Poster/Short-talk
Miha Stajdohar	Monday	W-P20	Poster
Egils Stalidzans	Wednesday	W-P21	Poster
Natalie Stanford	Wednesday	P-P21	Poster
Dalibor Stys	Monday	S-P23	Poster
Astghik Sukiasyan	Sunday	F-P22	Poster
Holly Ruth Summersgill	Sunday	P-P22	Poster
Neil Swainston	Sunday/Thursday	W-P22/W-S01	Poster/Short-talk
	Su, Mo, Wed.	CP-05	Comp. Prac.
Maciej Swat	Wednesday	S-P24	Poster
Jonathan Swinton	Saturday	T-08	Lecture
	Saturday	O-L02	Lecture
Balazs Szappanos	Monday	P-P23	Poster
Peter Tass	Thursday	WL-05	Lecture
Peter Taylor	Wednesday	P-P24	Poster
Bas Teusink	Su, Mo, Wed.	BB-05	Black Board
Jens Timmer	Monday	G-L03	Debate
Bogdan Tokovenko	Monday	G-P20	Poster
Aleksandra Tomaszewska	Wednesday	G-P21	Poster

Marko Toplak	Monday	W-P23	Poster
Eleni Tsompanidou	Sunday	S-P25	Poster
Lan Umek	Monday	F-P23	Poster
Jan Urban	Wednesday	W-P24	Poster
David van Dijk	Monday	S-P26	Poster
Jan Bert van Klinken	Wednesday	F-P24	Poster
Martin Valachovich	all days		organisation
Joep Vanlier	Wednesday	S-P27	Poster
Ilya Venger	Sunday	F-P25/S-S01	Poster/Short-talk
Malkhey Verma	Sunday	G-P22	Poster
Alja Videtič	Sunday	W-P25	Poster
Mark Walsh	Monday	G-P23	Poster
Ron Weiss	Thursday	WL-01	Lecture
Emilia Westerhoff	all days		organisation
Hans Westerhoff	Saturday	T-03	Lecture
	Monday	G-L03	Debate
Mike White	Sunday	SL-01	Lecture
Paul Wilcock	Monday	F-P26	Poster
Ko Willems van Dijk	Sunday	P-P25	Poster
Viola Wöckel	Wednesday	G-P24	Poster
Katy Wolstencroft	Su, Mo, Wed.	CP-05	Comp. Prac.
Koen van Grinsven	Sunday	S-P28	Poster
Jie Yang	Monday	P-P26	Poster
Lan Zagar	Wednesday	F-P27	Poster
Judit Zámborszky	Sunday/Monday	G-P25/G-S03	Poster/Short-talk
Jürgen Zanghellini	Monday	W-P26	Poster
Dan Zheng	Monday	G-P26	Poster

P - Poster, S - Short talk, Ch - chair, BB - blackboard, O - organization, L - Lecture, CP-computer, practical; sessions: F-foundations, G-genome, P-proof, S-systems, W-work

The Course Book - its Principles

Abstracts

All scientists present at the Course have been asked to formulate an abstract concerning their work or their interests in Systems Biology, even those that are too new to the field to have much to report on Systems Biology itself. Most have complied. Accordingly the abstracts vary widely in content and quality. Constructive criticism will be formulated for all student abstracts, and it is in this constructive mode that all discussions should proceed; after all this is a Course, not just a conference. Please note that all abstracts, posters as well as oral presentations, must be considered "*privileged personal communications*". No data may be cited or used in any kind of verbal or written scientific correspondence with third parties without explicit permission of the presenting author.

Course ('Abstract') Book - Paper

The Course book on paper is meant to serve as an in-hand tool at the course. It contains:

- Most Course information
- A list of when each participant has to present her/his work, or fulfill some other function
- The program, described linearly in time, with all presentations represented by their authors and titles
- Abstracts:
    - first the abstracts of the oral presentations in the sequence of the (day-time) program
    - Then the abstracts of the poster presentations (including the ones also presented as short talks), ordered per Symposium, then per type and then alphabetically.

Abstracts have been giving codes. The first letter refers to the symposium (**F, G, P, S and W**; for **F**oundations, **G**enome alive, **P**roof of the Pudding, **S**pace and time, and making systems **W**ork, respectively). The second letter denotes the type of presentation (OL for opening lecture, L for lecture, CL for closing lecture, S for short talk, P for poster, BB for Black Board, and CP for computer practical). Then a sequence number follows. For instance P-P22 refers to poster number 22 in the Symposium on Principles.

- a list of addresses

Course ('Abstract') Book - Electronic

The Course book can also be found as a pdf file on the USB stick provided. The file should be considered non-citable 'preprints'. The program will also be published on the World Wide Web (www.febs-sysbio2009.org).

Systems Biology Young Investigator Awards

The scientific merit of all abstracts (**posters** and **oral presentations**) submitted by **graduate students** and **postdoctoral researchers** as presenting authors will be evaluated by the teachers in the corresponding symposium. The best abstracts will be awarded a surprise prize, the **"Alpbach Young Investigator Award"** during the Farewell Party.

Website

The course and a set of related activities share a website http://www.febs-sysbio2009.org, which can be checked using the wireless network in many areas of the congress centre, e.g. by using any of the host computers in the computer rooms. The abstract book can also be found as a pdf file on the USB stick provided. The poster file should be considered a non-citable 'preprint'. The program will also be published on the web sites.

Technical Local Information

We wish you a very pleasant stay at the venue of the 3rd FEBS Advanced Lecture Course on Systems Biology in Alpbach. We need to draw your attention to the following points:

Connections – You and the World

The meeting office has a laser printer, a copy machine, as well as phone (+43(5336)600-100) and Fax (+43(5336)600-200). Its mobile phone numbers are: +43 676 4933302 (Regina Klaus) and +31 6 520 76 384 (Anneke Koster). Any incoming FAX and phone call should clearly identify the addressee. At the venue, you can be reached, for urgent matters only, at the following e-mail address: info@febs-sysbio2009.org , identifying the addressee by having: 'Urgent e-mail for xxx' on the subject line. For non-urgent matters use www.mail2web.com to inspect your own e-mail account, or use www.hotmail.com. At many locations in the congress centre there is wireless internet, but not in the main lecture room. Please refrain from downloading gigabytes; the limited bandwidth to the outside worlds; there is too many Alps in the way… Computers, some of which are linked to the internet, are available close to/in the computer rooms.

Internet – You and the World

A local network will be set up for the course. Because of limited connectivity with the outside world, we cannot guarantee its performance when used for that, unless our course attendees refrain from downloading large files.

Departure

Regular departure from the course is Friday morning after breakfast. At the message board near the Meeting Office there is a 'Departure sheet' which contains your name. Please be so kind to write the date and time of departure you request next to your name. The organizers will 'OK' your name, when they ensured transportation for you to Innsbruck airport or Wörgl train station. Please allow 90 minutes for the transportation from the venue to the airport (and then of course more than 60 minutes for boarding the flight).

FEBS Evaluation Form

Most importantly, the FEBS EVALUATION FORM!
Please complete and return the lilac FEBS Evaluation Form you will find in your Meeting Pack to the meeting office no later than Thursday, March 12. Any and all criticisms (both positive and negative) are highly appreciated, because we are aware that nothing in this world can be perfect, but many things can be improved. It is imperative that we receive feedback from as many participants as possible (the best of course would be from all of you). Think about it, no return of

evaluation forms - no more FEBS Courses on Systems Biology in the future, and, lack of gratitude to FEBS for sponsoring so much of the present course.

FEBS-SysBio2009 Course Office

The meeting office is located next to the main Lecture Hall (Schrödinger Hall). If you need help in any way, please contact the meeting office or call the 24-hour FEBS-SysBio2005 hotlines (+43 676 49333 02 (Regina Klaus) or +31 6 520 76 384 (Anneke Koster)). Daily office hours are in the morning from 7.30 – 8.30 am, at noon from 12.00 – 13.00 hours and in the evening from 7.30 – 9.00 pm.

Help

Any member of the local organizing staff, who wears **FEBSSYSBIO2009** neck cords, will try to help you anytime with any problem you may encounter. Alternatively, turn to the Meeting Office, or call the hotline phones +43 676 49333 02 (Regina Klaus) and +31 6 520 76 384 (Anneke Koster).

Message Board

Next to the Meeting Office there is a board for messages.

Meals, Beverages & Lunch Packages

Your registration fee includes all meals (breakfast, coffee, tea, drinks, pastries during the program's tea and coffee breaks, lunch, and dinner) and some non-alcoholic beverages at lunch, dinner and in the poster halls during the poster sessions. Other beverages consumed during lunch and dinner, are not included.
If you intend to hit the slopes or otherwise go out early for the afternoon break, you may wish to take a lunch package with you, rather than to eat lunch in the restaurant. You must then pick up a "Lunch Ticket" at the meeting office. Each day has a different color-coded Lunch Ticket with your name on it. You can pick up your Lunch Ticket at the meeting office for any day of the week during regular office hours, at the latest the day before consumption. IMPORTANT, should you for whatever reason not consume your lunch package, you cannot have regular lunch instead on the same day, because the kitchen prepares a limited number of meals, based on the number of meeting participants. Lunch packages themselves can be picked up in the MOLDEN Foyer of the Congress Centre around noon time in exchange for YOUR LUNCH TICKET for that day.

Payments

Any substantial payment to the course organization must have been made by giro/bank transfer before the course (cf. www.febssysbio.net.). Reimbursements will follow the same route. The course currency is euros. We accept cash (€UR/US$/UK£,JP¥) at current exchange rates (plus exchange cost) we obtain through the www (no credit cards). A bank and a cash machine are located on the main road in Alpbach. Banks are open from 8 AM-12 AM and 2 AM to 5 AM in the afternoon (Mon-Fri).

Presentations

Oral presentations: All participants giving oral presentations are requested to be present in the lecture hall half an hour before their session starts (*i.e.* at 8.00 a.m. for talks in the morning and at 16h00 for talks in the afternoon; a member of the organizing committee will assist you). We prefer your files (*i.e.* Powerpoint) as a directory called ''yournameSBcourse' [*e.g.* WesterhoffSBcourse] on a USB stick or CD-ROM. If your presentation links to any other files (*e.g.* movies), these should be in a single directory as the presentation with appropriate links. After copying the directory with your name to the hard disk of either of the two presentation computers in the lecture Hall (*i.e*. a MacIntosh Powerbook or a PC Laptop), you should check whether your presentation and its links actually function. Alternatively, you may connect your own computer to the LCD projector for your talk, but only if you have checked this with the assistant, half an hour in advance.
You can use the computers in the computer rooms to check your presentation beforehand.
In case of a presentation that uses media other than LCD projection from computer, please inform the organizers well in advance: info@febs-sysbio2009.org .
Posters: Course participants presenting Posters (including presenters of Short Talks) are requested to mount their posters in the dedicated poster areas on the poster board with their poster number (follow the signs) on Saturday evening. Your poster number is identical to the number you will find in the Course book next to the title of your abstract, in the Course book in the address list next to your name, and in the task list in the Course book (*e.g.* P-P04) (a Poster number always has a 'P' for 'Poster', or an 'S' for 'Short Talk' subsequent to the hyphen). If necessary, members of the organizing committee will help you mounting your poster on paper sheets first. For all other poster walls, pins are provided and local organizers will be pleased to assist you if necessary. Posters will stay on display until the evening of Thursday, March 12. The presenting authors needs to be present for at least one hour at the beginning of their poster session. Poster numbers n-2 will be presented and discussed Sunday evening from 21h00 for at least an hour. Numbers 3n-1 will be presented Monday evening. Numbers 3n-3 will be presented Wednesday evening. Presenters of short talks are requested to present their poster on the day of their short talk. The dates of presentation can also be gleaned from the *Participant task list* in this course book (*cf.* above).
Blackboard presentations: A data projector (beamer) will be available. Presenters are expected to connect their own personal computer. Flipovers will be available as well.
Computer presentations: A local wireless intranet and 20 password protected portable computers wil be available, distributed between 3 parallel sessions. Anyone wishing to demonstrate a computer program, or to access e-mail or internet through these computers should first ask one of the organizers or helpers (recognizable by the red neck cord). Presenters of Computer Practicals should consult with the organizing committee (e.g. ursula.kummer@bioquant.uni-heidelberg.de) beforehand about the software to be used, as it will need to be preinstalled.

Skiing and Outdoor Leasure

Nearby skiing slopes at the Alpbacher Bergbahnen as well as cross-country skiing trails strongly encourage informal scientific discussions in fresh air during the afternoon breaks. Rental gear and ski-passes will be made available at special FEBS-course discounts from Sport Connys**.**
The afternoon skibuses leave from the Hotel Böglerhof at 1pm. Return to the Hotel Böglerhof at 4pm, 4:10 pm or 4:20 pm. A detailed schedule is available at the meeting office.

Social Program

Innsbruck: On Tuesday, we have scheduled for all course participants to visit Innsbruck. Buses will leave the Congress Centre around 13h30 (precise times to be announced) and return to Alpbach around 23h30. There will be time for walks or shopping in downtown Innsbruck, but there will also be a common program. As you might expect, you should not forget to bring your ears, eyes, and taste buds …… Also, be ready to discuss Systems Biology, on the bus, or in the …….. This excursion is mandatory for all participants as this is meant for networking!

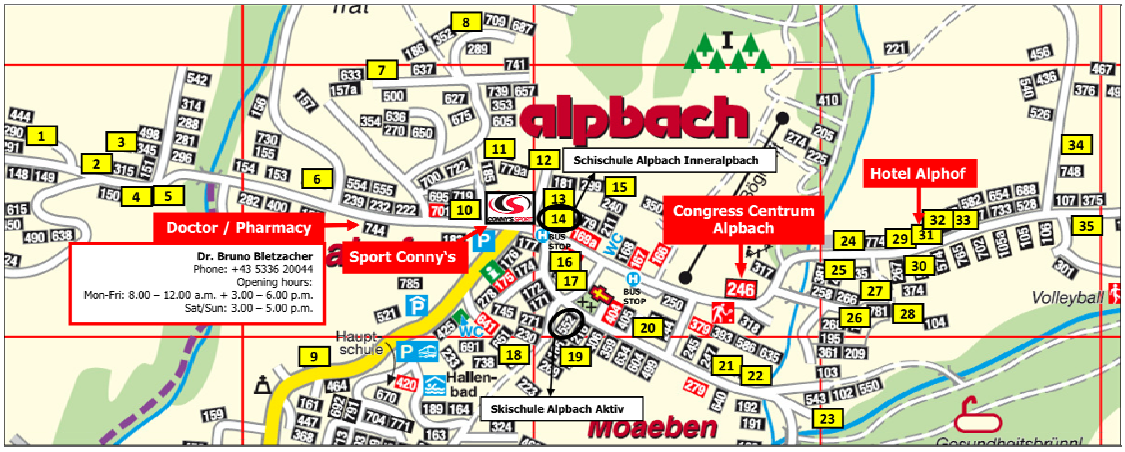
***Alternative tours*:**
A minimum attendance of 15 persons is required for following afternoon tours starting at 1pm (please do not forget to reserve your lunch pack the day before!):

Monday, March 9:	Wattens Kristallwelten with stop in Rattenberg
	Bus fee: EURO 25/person
	Entrance fee Kristallwelten: EURO 8/person
Wednesday, March 11:	Kufstein
	Bus fee: EURO 25/person
	Possibility to visit the Wine Glass Company "Riedl Glas"
Thursday, March 12:	Kitzbühel and Wildpark Aurach
	Bus fee: EURO 25/person
	Entrance fee Wildpark Aurach: EURO 3,50/person

The tours can be booked in the meeting office on site!

Congress Centrum Alpbach

VILLAGE MAP ALPBACH



INTERNATIONAL AREA CODE AUSTRIA +43 / LOCAL AREA CODE ALPBACH +5336

Nr.	Accommodation	Hnr.	Phone
31	Alphof	486	-5371
16	Andreas	394	+43 664/4229494 (M)
2	Barbara	491	-5183
34	Dorferleiten	527	-5163
30	Dorferstuck	513	-5165
21	Erlebnisbe	248	-5388
11	Enthofer	778/779	+43 664/4104918 (M)
33	Fürstenfeld	562	-5737
6	Fürstenhäusl	188	-5031
32	Fürstenhof	437	+43 664/5915585 (M)
4	Gästehaus Larch	737	-5875
3	Gmehblick	518	-5279
22	Gratlspitz	249	-5243
24	Hanslerhof	109	-5368
27	Karwendelstein	280	-5398
14	Körner	178	-5171
8	Kristall	740	-5934
35	Lederer's Zuhaus	524	-5531
26	Lehrerhäusl	195	-20470
17	Meixner's	170	-5171
16	Moa	173	-20253
19	Moahäusl	207	-5937
20	Mühlbachhof	587	-5175
1	Panorama	391	-5500
10	Post	184	-5203
7	Postfeld	606	-5923
28	Reichelhner	389	-5208 or -5394
13	Sarna	188	-5132
20	Schlieblick	243	+43 664/4010263 (M)
29	Thorerix	494	-5386
12	Thomas	351	-5944
9	Weiherhof	445	-5747
5	Wildenkreuz	261	-5910
15	Will	309	-5714
25	Zillertal	489	-5503

The course, workshop and pre-courses will take place at the

Congress Centrum Alpbach
A-6236 Alpbach, Tirol, Austria, EU
Tel. +43(5336)600-102
Fax. +43(5336)600-200
E-Mail: eva.wille@alpbach.at

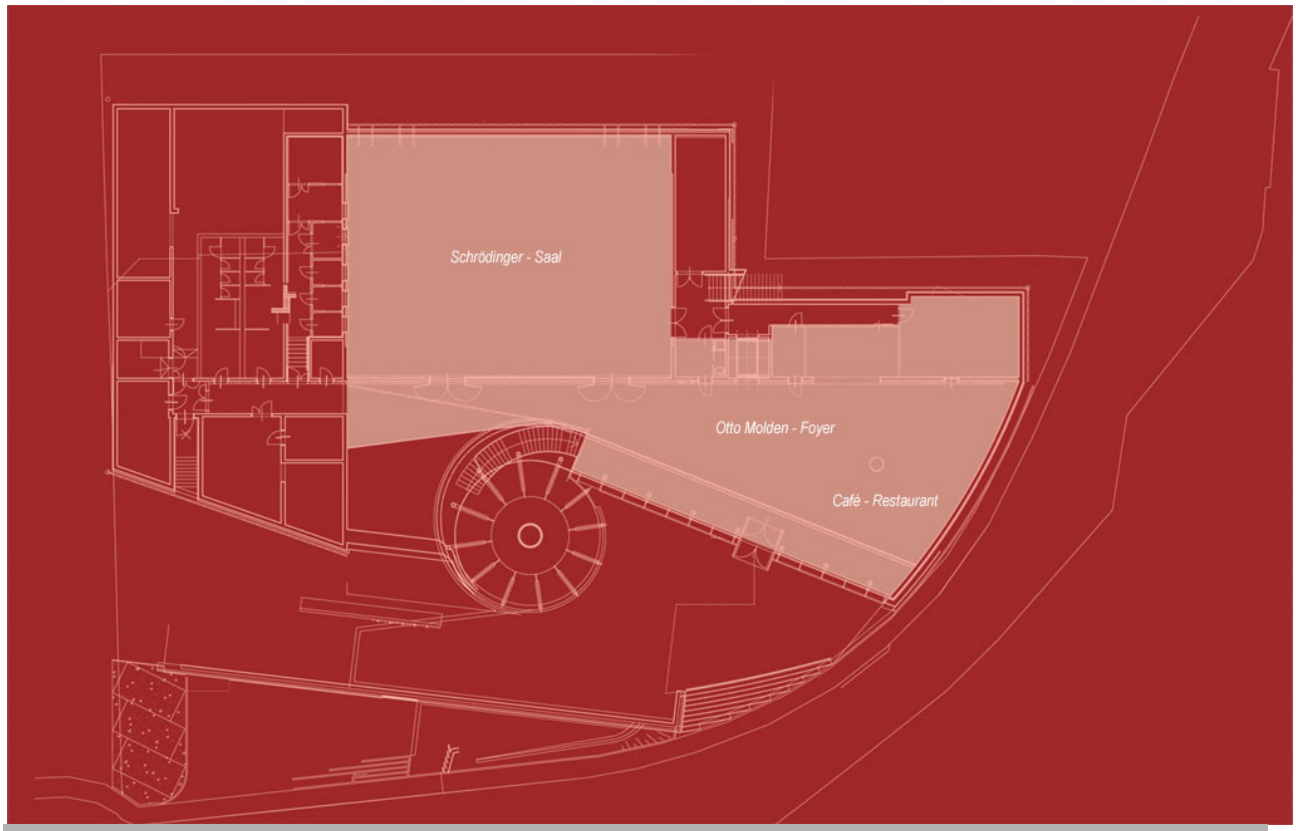
www.congressalpbach.com ; www.alpbach.at

Contact person at the congress centre: Ms Eva Wille

In August 1945 Alpbach was the setting for the first of the international seminars to be organised in Europe after the War by Otto Molden und Simon Moser. Since then the Alpbach European Forum has been held every year in August, with the Austrian College as the official organisers.

Over the decades, the atmosphere of a free spiritual community of thinkers meeting in the liberating setting of the Alpbach Valley has attracted many famous names from the worlds of science, business, the arts and politics - people who have themselves shaped the thinking of their age, such as Ernst Bloch, James Buchanan, Ralf Dahrendorf, Gottfried von Einem, Friedrich von Hayek, Cardinal Franz König, Konrad Lorenz, Karl Raimund Popper, Erwin Schrödinger, Fritz Wotruba, Indira Gandhi, Jacques Delors, Yitzak Rabin, Bruno Kreisky, Karl Kuchler, Denis Noble and many others. For years Alpbach was the home of the author Alma Holgersen, and Arthur Koestler had a house built here, which he called the "Schreiberhäusl". The grave of Nobel prize-winner Erwin Schrödinger, known for both Hψ=Eψ and for the Schrödinger paradox the resolution of which was one of the early aspects of Systems Biology *avant la lettre*, lies in the village cemetery.

Lower floor and upper floor of the Congress Centre Alpbach



Scientific Program:

Program of the advanced lecture course

FEBS SysBio2009

From Molecular Biology to Biological Function

and the ERASysBio Training workshop and the precourses

Alpbach, March 7-13

Friday, March 6

Setting up		
MOSES pre-workshop (invitees only)	**(Popper Hall)**	**09:00 – 13:00**
Lunch (individually)	**(village)**	**13.00 – 14:00**
MOSES workshop (invitees only)	**(Popper Hall)**	**14:00 – 19:00**
Organization try outs (organisers and helpers only)	**(Koestler Hall)**	**13:00 – 19:00**
Arrival participants ERASysBio Workshop and pre-courses participants		
Pre-course registration & Accommodation (Molden foyer Congress Centre		**16:00 – 20:00**
Organisers meeting	**(Popper Hall)**	**20:00 – 22:00**
Pre-course registration & Accommodation (Molden foyer Congress Centre)		**22:00 – 22:30**
(late arrivals call one of the FEBS-SysBio2009 Hotlines)		

Saturday, March 7

Getting Ready

(co-organized by ERASysBio, BBSRC and FEBSSysBio)

Pre-course Registration (Molden foyer Congress Centre) 8:30 - 9:00

Cafeteria open *8:00 - 22:00*

Getting ready for the age of Systems Biology – 3 parallel strands 9:00 - 16:45

1. The ERASysBio Workshop: Towards European Standards for PhD training in Systems Biology (Popper room)

2. Preparatory transdisciplinary training for mathematicians and biologists

> *What is Life for mathematicians? The bare essentials of cell biology (Koestler room)*

> *"1 + 1 = 3"; number crunching for biologists (Von Einem room)*

Official Opening of FEBSSysBio2009 16:55 - 17:00

Karl Kuchler & Hans V. Westerhoff

From learning to train, to training to learn – *the Reinhart Heinrich Lecture*

O-L01 **Yuri Lazebnik (**Cold Spring Harbor) 17:00 - 17:35

Can a (systems) biologist fix a radio?

Official Closure of the ERASysBio Workshop 17:35 - 17:40

Gabriela Pastori (BBSRC & ERASysBio**)**

Reception: Getting to know each other (Molden foyer) *17:40 - 18:30*

Saturday, March 7

(Popper Room) Workshop on: European Standards for PhD Training in Systems Biology

(organised by ERASysBio and BBSRC) {*specific pre-registration required*}

…Workshop on: European Standards for PhD Training in Systems Biology

T-L01 **Gabriela Pastori** (BBSRC & ERASysBio) 9:00 - 9:05
Welcome by ERASysBio

Session 1 – The experts talk **9:05-10:30**
Chair: Karl Kuchler (Medical University Vienna)

T-L03 **Hans V. Westerhoff (**DTC-ISBML, Manchester/BCA, Amsterdam) 9:05 - 9:25
Biting bullets: UK Doctoral Training Centres in Systems Biology

T-L04 **Ursula Kummer** (BioQuant, Heidelberg) 9:25 - 9:45
Training in Heidelberg

Morning Keynote Lecture

T-L05 **Douglas Lauffenburger (**MIT) 9:45 -10:30
The CSBi programme at MIT

Drinks and pastries (Kunst foyer) *10:30- 10:45*

Session 2 – Interdisciplinary / transdisciplinary training **10:45-11:45**
Chair: Stefan Hohmann (University of Gothenburg)

T-L06 **Karl Kuchler** (Medical University of Vienna) 10:45-11:00
FEBS' role

T-L07 **Carsten Carlberg (**Universities of Kuopio and Luxembourg) 11:00 - 11:15

Marie Curie Training Sites & Industry Host Fellowships

T-L08 **Jonathan Swinton** (AstraZeneca) 11:15 - 11:30

Industry's wishlist

Katya Rybakova, Jure Acimovic, Siavask Partow, Simon Moon, Ben Small 11:30 - 11:45

Students' wishlist

Session 3 – The wishlist & challenges breakout session **11:45 - 12:40**

(Popper, Von Hayek and Schrödinger rooms)

Chair: Carsten Muessig

Discussions 11:45 - 12:30

Wrap up, and planning for the afternoon 12:30 - 12:40

Lunch (Kunst foyer, Congress Centre) *12:45 - 13:30*

Session 4 – Breakout session **13:45 - 17:00**

(Popper, Von Hayek and Schrödinger rooms)

Chair: Hans V. Westerhoff

Discussions 13:45 - 15:00

Drinks (Kunst foyer, Congress centre) *15:00 - 15:30*

Reporting 15:30 - 16:00

Discussion and conclusions 16:00 - 16:45

The blue print structure and content of the white paper

Official O pening of FEBS SysBio2009 (Schrödinger Hall) 16:55 - 17:00

Karl Kuchler & Hans V. Westerhoff

From learning to train, to training to learn – *the Reinhart Heinrich Lecture* (Schrödinger Hall)

O-L01 **Yuri Lazebnik** (Cold Spring Harbor) 17:00 - 17:35

Can a (systems) biologist fix a radio?

Official C losure of the ERASysBioWorkshop (Schrödinger Hall) 17:35 - 17:40

Gabriela Pastori (BBSRC & ERASysBio)

Reception: Getting to know each other (Molden foyer, Congress centre) *17:40 - 18:30*

Saturday, March 7

(Von Einem Hall)

…Preparatory transdisciplinary training in Systems Biology: Mathematics

(organised by FEBSSysBio) {specific pre-registration required}

Pre-course Registration (Molden foyer, Congress Centre) *8:30 - 9:00*

Preparatory transdisciplinary training in Systems Biology: Mathematics **9:00-16:45**

M-L01 **David Fell** (Oxford) 9:00-10:30

Handling functions, parameters and variables illustrated with enzyme kinetics

Drinks and pastries (Kunst foyer, Congress centre) *10:30-10:45*

M-L01 **David Fell** (Oxford) 10:45-12:45

Calculating time courses: numerical integration of differential equations

Lunch (Kunst foyer, Congress centre) *12:45-13:30*

M-L01 **David Fell** (Oxford) 13:30-15:00

Mathematical tools for analyzing systems, illustrated by metabolic networks

Drinks (Kunst foyer, Congress centre) *15:00-15:30*

M-L01 **David Fell** (Oxford) 15:30-16:45

Metabolic Control Analysis - an introduction to sensitivity analysis

Official Opening of FEBSSysBio2009 16:55-17:00

Karl Kuchler & Hans V. Westerhoff

From learning to train, to training to learn – *the Reinhart Heinrich Lecture*
(Schrödinger Hall)

O-L01 **Yuri Lazebnik (**Cold Spring Harbor) 17:00-17:35

Can a (systems) biologist fix a radio?

Official Closure of the ERASysBioWorkshop 17:35-17:40

Gabriela Pastori (BBSRC & ERASysBio)

Reception: Getting to know each other (Molden foyer, Congress centre) *17:40-18:30*

Saturday, March 7

(Koestler Hall)

…Preparatory transdisciplinary training in Systems Biology: Cell Biology

(organised by FEBSSysBio) {specific pre-registration required}

Pre-course Registration (Molden Foyer; Congress Centre)	8:30 - 9:00
Preparatory transdisciplinary training in Systems Biology: Cell Biology	**9:00 - 16:45**
C-L01 **Maria Nardelli** (Manchester) Cell Biology for Systems Biologists: organisms	9:00 - 10:30
Drinks & pastries (Kunst foyer, Congress centre)	*10:30 - 10:45*
C-L01 **Maria Nardelli** (Manchester) Cell Biology for Systems Biologists: molecules and pathways	10:45 - 12:45
Lunch (Kunst foyer, Congress centre)	*12:45 - 13:30*
C-L02 **Ursula Klingmüller** (Heidelberg) Cell Biology for Systems Biologists: signaling pathways	13:30 - 15:00
Drinks (Kunst foyer, Congress centre)	*15:00 - 15:30*
C-L03 **Ursula Klingmüller** (Heidelberg) Cell Biology for Systems Biologists: experimental quantification	15:30 - 16:45

Official Opening of FEBSSysBio2009 (Schrödinger Hall) 16:55 - 17:00
Karl Kuchler & Hans V. Westerhoff

From learning to train, to training to learn – *the Reinhart Heinrich Lecture*

O-L01 **Yuri Lazebnik** (Cold Spring Harbor) 17:00 - 17:35
Can a (systems) biologist fix a radio?

Official Closure of the ERASysBioWorkshop (Schrödinger Hall) 17:35 - 17:40
Gabriela Pastori (BBSRC & ERASysBio)

Reception: Getting to know each other (Molden foyer, Congress centre) *17:40 - 18:30*

Saturday, March 7

(Schrödinger Hall)

From Molecular Biology to Biological Function

{for all course and workshop participants}

…FEBSSysBio2009: Opening of the Advanced Lecture course

FEBS-Course Registration	**11:30 – 18:30**
FEBS-Course Registration	**20:00 - 22:30**

Official Opening of FEBSSysBio2009 (Schrödinger Hall) 16:55 - 17:00

Karl Kuchler & Hans V. Westerhoff

From learning to train, to training to learn – *the Reinhart Heinrich Lecture*

O-L01 **Yuri Lazebnik** (CSHL) 17:00 - 17:35

Can a (systems) biologist fix a radio?

Official Closure of the ERASysBioWorkshop 17:35 - 17:40

Gabriela Pastori (BBSRC & ERASysBio)

Reception: Getting to know each other (Molden foyer, Congress centre) *17:40 - 18:30*

Welcome dinner (in Hotel Alphof) *18:30 - 19:45*

Coffee & drinks (Molden foyer, Congress centre) *19:45 - 20:00*

Opening session Chair: Hans V. Westerhoff (Schrödinger Hall) **20:00 - 21:30**

O-L02 **Jonathan Swinton** (AstraZeneca) 20:00 - 20:30
Can systems biology be at the heart of drug discovery?

The AstraZeneca keynote lecture

O-L03 **Bela Novak** (Oxford) 20:30 - 21:15
Cellular decision-making by systems-level feedbacks

Plenary discussion 21:15 - 21:30

Sunday, March 8

Systems Biology in Space and time

Cafeteria open — *8:15 - 19:30*

Systems Biology in Space and time – Methodology Lectures — **8:30 - 10:00**

(Schrödinger Hall)

Chair: Jens Timmer (Freiburg)

Chair's introduction — 8:30 - 8:35

S-L01 **Mike White** (Liverpool) — 8:35 - 9:20

Signalling in space-time: Imaging of the dynamics of the NF-kappaB system [*didactic lecture*]

S-L02 **Boris Kholodenko** (Dublin) — 9:20 - 9:40

Cell-signaling dynamics in time and space

S-L03 **Douglas Lauffenburger** (MIT) — 9:40 - 10:00

Systems Biology of Cell Migration

Drinks and Pastries (Otto Molden Foyer) — *10:00 - 10:20*

Systems Biology in Space and time – Tutorials (3 in parallel) — **10:20 - 11:05**

(Schrödinger, Popper, Koestler Halls, respectively**)**

Mike White, Boris Kholodenko, Douglas Lauffenburger

Drinks (Otto Molden Foyer) — *11:05 - 11:20*

Systems Biology in Space and time – Results Lectures **11:20 - 12:30**

Chair: Jens Timmer (Schrödinger Hall)

S-L02 **Boris Kholodenko** (Dublin) 11:20 - 11:40

Cell-signaling dynamics in time and space

S-L03 **Douglas Lauffenburger** (MIT) 11:40 - 12:00

Systems Biology of Cell Migration

Chair's resumé & students posing issues – General discussion 12:00 - 12:30

Lunch (Hotel Alphof)/Lunch packages (Molden foyer) & Afternoon Break (Slopes) 12:30 - 16:30

Drinks & pastries (Kunst Foyer) 16:00 - 16:30

Black **B**oard teaching / **C**omputer **P**racticals **16:30-18:05**

Chairs: Ursula Kummer, Jacky Snoep & Edda Klipp

---------- BBCP Session 1a – Sunday early (Parallel) **16:30-17:15**

BB-01 **David Fell** (Koestler room) 16:30-17:15
An introduction to Metabolic Control Analysis – theory and applications

BB-02 **Jeroen Jeneson & Natal van Riel** (Hayek room) 16:30-17:15
Systems physiology

BB-03 **Matthias Heinemann** (Schrödinger Hall) 16:30-17:15
Everything about metabolism

CP-01 **Richard Adams & Igor Goryanin** (Popper room) 16:30-17:15
Edinburgh Pathway Editor and SBSIVisual – tools for analysing and visualizing biological pathways

CP-02 **Marcel Schilling & Sebastian Bohl** (Von Einem room) 16:30-17:15
Model building, parameter estimation and identifiability analysis

---------- BBCP Session 1b – Sunday late (Parallel) **17:20-18:05**

BB-04 **Douwe Molenaar** (Von Hayek room) 17:20-18:05
Vertical genomics: the how and why of regulation

BB-05 **Bas Teusink** (Schrödinger Hall) 17:20-18:05
Flux balance analysis

CP-03 **Frank Bruggeman et al.** (Von Einem room) 17:20-18:05
Modelling in cell biology

CP-04 **Ursula Kummer** (Koestler room) 17:20-18:05
Introduction to modelling

CP-05 **Katy Wolstencroft, Olga Krebs, Neil Swainston& Jacky Snoep**
(Popper room) 17:20-18:05
Data management using Taverna, JWS Online and SABIO-RK; hands on computer tutorials linking experimental data to model interpretation using workflows

Drinks & pastries (Molden foyer) *18:05-18:20*

Systems Biology in Space and time – Short Talks & Discussion **18:20-19:25**

Chair: Jens Timmer (Schrödinger Hall)

S-S01 **Ilya Venger** 18:20-18:35

Understanding dispensability of duplicate genes in the metabolic network of *Saccharomyces cerevisae* via high-throughput metabolic profiling

S-S02 **Muhammed Ali Faisal** 18:35-18:50

A hybrid model for protein translation

G-S01 **Katja N. Rybakova** 18:50-19:05

The population level transcriptional cycling arises from the timer-like nature of single cell transcription

Speaker's Panel on issues raised in the morning **19:05-19:25**

Dinner (Hotel Alphof) *19:30-21:00*

Drinks (Congress Centre Kunst Foyer) *20:45-21:15*

Poster Session 1 **21:00-23:30**

Viewing posters	(Liechtenstein & Von Hayek Halls)	21:00-21:45
Free poster wandering	(Liechtenstein & Von Hayek Halls)	21:45-22:30
Bar poster discussions	(5 in parallel, presenters and teachers only)	22:30-23:30

*(**S**: Popper, **F**: Von Einem, **P**: Koestler, **G**: Von Hayek, **W**: Schrödinger)*

Bar (Kunst Foyer) *(cash or vouchers)* *21:15 - 23:30*

Sunday's Poster Presentations (Liechtenstein & Von Hayek Halls)

Systems Biology in Space and Time

S-P01 Modeling crosstalks of Wnt and NF-kappaB signaling
Uwe Benary *& Jana Wolf*

S-P04 Automated modeling of dynamic systems in systems biology
Darko Čerepnalkoski *& Sašo Džeroski*

S-P07 Towards calculating the IV curve of an ion channel from its structure
Philip Fowler*, Enrique Abad & Mark Sansom*

S-P10 Making models: a review of systems biology yeast models and their relevance to human disease
Edward Kent*, Helen Kotze, Sharaz Mohammed, Caroline Paget & Paul Wilcock*

S-P13 Model-based prediction of early angiogenic pattern formation
Carsten Mente*, Georg Breier & Andreas Deutsch*

S-P16 Soft computing: Fuzzy logic
Sayantan Nath

S-P19 Integrative modelling of cAMP control on metabolism in yeast
Michael Rosefield*, Lubomira Stateva & Jean-Marc Schwartz*

S-P22 Interplay of Two Negative Regulators in Shaping the Kinetics of the PI3K/Akt Pathway in the Hematopoietic System
Bin She*, Lu Wang, Carlos Salarza, Marcel Schilling, Seong-Hwan Rho, Jens Timmer, Thomas Hoefer & Ursula Klingmueller*

S-P25 The transition from growing to non-growing *Bacillus subtilis* cell - a systems biology approach (SysMo)
Eleni Tsompanidou*, Emma L Denham & Jan Marteen van Dijl*

S-P28 Integration of experimental and computational data on expression and metabolism in *Saccharomyces cerevisiae*
Koen van Grinsven*, Barbara Bakker, Hans V. Westerhoff*

Foundations for Systems Biology

F-P01 Structured output prediction of enzyme function
Katja Astikainen*, Liisa Holm, Esa Pitkänen & Juho Rousu*

F-P04 Prediction of interacting sites in protein complexes
Lisa Bartoli*, Piero Fariselli, Ivan Rossi & Rita Casadio*

F-P07 Computing the atom mappings for metabolic reactions
Markus Heinonen

F-P10 Gene interaction networks of cholesterol biosynthesis and regulation in mice
Anja Korencic*, Jure Acimovic, Marko Golicnik, Damjana Rozman, Martina Perse, Ingemar Bjorkhem, Gregor Majdic & Katarina Kosmelj*

F-P13 Implicit dynamic analysis of microarray time course data
Simon Moon*, Anna Bergau, Christian Tiemann, Maggie Dallman & Jaroslav Stark*

F-P16 Finding non-coding RNA in *C. elegans* species
Shanmukha Sampath Padmanabuni

F-P19 Structural and practical identifiability analysis by profile likelihood exploitation
Andreas Raue*, Clemens Kreutz, Thomas Maiwald & Jens Timmer*

F-P22 The development of computer approaches for diagnostics of diseases at its development in lipid peroxidation
Astghik Sukiasyan*, Kirakosyan Armen, Hambardzumyan Armen & Tadevosyan Artashes*

F-P25 Understanding dispensability of duplicate genes in the metabolic network of *Saccharomyces cerevisae* via high-throughput metabolic profiling
Ilya Venger*, Ilana Rogachev, Shira Mintz, Yitzhak Pilpel & Asaph Aharoni*

Proof of the Pudding

P-P01 Modelling the anagen-catagen switch in the human hair cycle
***Yusur Al-Nuaimi**, Rachel Watson, Gerold Baier & Ralf Paus*

P-P04 Novel insights into the gene regulatory networks regulating human Thelper cell differentiation
***Laura Elo**, Henna Järvenpää, Soile Tuomela, Helena Ahlfors, Sunil Raghav, Bhawna Gupta, Riikka Lund, Johanna Tahvanainen, Matej Oresic, Omid Rasool, Kanury Rao, Tero Aittokallio & Riitta Lahesmaa*

P-P07 The role of phosphorylation in circadian rhythms
***Ines Heiland**, Thomas Hinze & Stefan Schuster*

P-P10 Network modeling metabolic exchange in *Staphylococcus aureus* N315, COL and Newman strains
Chunguang Liang, Manuel Liebeke, Susanne Engelmann, Christiane Wölz, Friedrich Götz, Jörg Bernhardt, Michael Lalk, Michael Hecker & Thomas Dandekar

P-P13 Identifying red and white biotechnological products through *in silico* studies
Olusegun James Oshota, Naglis Malys, Evangelos Simeonidis & Pedro Mendes

P-P16 A metabolic control analysis-based approach to studying robustness and fragility
***Mark Quinton-Tulloch**, Kieran Sharkey & Hans V. Westerhoff*

P-P19 A systems biology pipeline for biochemical networks
***Evangelos Simeonidis**, Neil Swainston, Hanan Messiha, Naglis Malys, Kathleen Carroll, Warwick Dunn, Farid Khan, Kieran Smallbone, Irena Spasic, Dieter Weichart, John McCarthy, Norman Paton, Simon Gaskell, Pedro Mendes & Hans V. Westerhoff*

P-P22 Elementary mode analysis of the *Trypanosoma brucei* glycolytic pathway
***Holly Ruth Summersgill**, Suzanne Geenen, Peter Taylor & Emily Armitage*

P-P25 The level of tristearin in high fat diets determines hepatic insulin sensitivity
Sjoerd van den Berg, Silvia Bijland, Bruno Guigas, Margriet Ouwens, Peter Voshol, Rune Frants, Louis Havekes, Hans Romijn & ***Ko Willems van Dijk***

The Genome Alive

G-P01 Sampling as a crucial step in systems biology experimental design
***Jure Acimovic**, Anja Korencic, Marko Golicnik, Damjana Rozman, Martina Perse, Ingemar Bjorkhem, Gregor Majdic & Katarina Kosmelj*

G-P04 Integrated analysis of miRNAs and genes expression data
***Marta Biasiolo**, Mattia Forcato, Alessandro Coppe, Andrea Bisognin, Stefania Bortoluzzi & Silvio Bicciato*

G-P07 Combining high throughput expression and epigenetics data to elucidate mammalian retinogenesis
***Michael Elgart**, Varda Oron-Karni, Pazit Oren-Giladi, Yitzchak Oschry, Gideon Rechavi & Ruth Ashery-Padan*

G-P10 A model for expression-dependent selection of metabolic gene dosage
Jean-François Gout, Laurent Duret & ***Daniel Kahn***

G-P13 SignaLink, a signaling pathway database: theoretical and practical applications
***Tamas Korcsmaros**, Mate Szalay, David Fazekas, Petra Rovo, Zoltan Spiro, Tibor Vellai & Peter Csermely*

G-P16 Systems Biology Metabolic Modeling Assistant (SBMM): An ontology-based tool to integrate metabolic data for kinetic modeling
***Armando Reyes Palomares**, Raul Montañez, Alejandro del Real-Chicharro, Miguel Angel Medina & Francisca Sanchez-Jimenez*

G-P19 Design and mathematical modeling of synthetic clock circuit in yeast
***Oksana Sorokina**, Anita Kapus, Laszlo Kozma-Bognar & Andrew J. Millar*

G-P22 MOSES (Microorganism Systems biology: Energy and *Saccharomyces cerevisiae*)
***Malkhey Verma**, Stephen Wilkinson, Maksim Zakhartsev, Kieran Sharkey, Ralf Stuer, Walter Glaser, Ana Kitanovic, Martin Valachovic, Femke Mensonides, Peter Ruoff, Karl Kuchler, Matthias Reuss, Barbara Bakker, Stefan Wölfl & Hans V. Westerhoff*

G-P25 Computational analysis of effects of DNA damage response on circadian rhythms
***Judit Zámborszky**, Christian I. Hong & Attila Csikász-Nagy*

Making Systems  ork

W-P01 Apolipoprotein B/apolipoprotein A-I ratio in relation to various definitions of metabolic syndrome among Saudi patients with type 2 diabetes mellitus
***Assim Alfadda**, Nasser Al-Daghri & Usman Malabu*

W-P04 Protein quantification on protein arrays
***Daniel Kaschek**, Lorenza D'Alessandro, Bettina Hahn, Alexandra Kienast, Ursula Klingmüller, Wolf D. Lehmann, Seong-Hwan Rho & Jens Timmer*

W-P07 Solving the chemical master equation using sliding windows
***Maria Mateescu**, Verena Wolf, Rushil Goel & Thomas A. Henzinger*

W-P10 The utility of gene sets for the analysis of cancer gene expression data
***Minca Mramor**, Marko Toplak, Tomaz Curk & Blaz Zupan*

W-P13 Glycerol as a platform chemical for high added value products through metabolically engineered *Saccharomyces cerevisiae*
***Marta Papini** & Jens Nielsen*

W-P16 Metabolic engineering of *Saccharomyces cerevisiae* for biochemical production from xylose
***Gionata Scalcinati**, José M. Otero, Jennifer R.H. Van Vleet, Thomas W. Jeffries, Jens Nielsen & Lisbeth Olsson*

W-P19 Making the right choice: an evaluation method for ranked lists of biomarkers
***Ivica Slavkov** & Saso Dzeroski*

W-P22 Parameterisation of SBML models and visualization of experimental data through CellDesigner plugins
***Neil Swainston**, Hanan Messiha, Kathleen Carroll & Pedro Mendes*

W-P25 Genetic factors and the susceptibility to osteoporosis in the genetic isolate of Carlantino
***Alja Videtič**, Laura Esposito, Sara Bertok, Uros Hladnik, Sheila Ulivi, Antonella Fabretto, Carmen Lanzara, Francesco Bertoldo, Paolo Gasparini & Adamo Pio d'Adamo*

Monday, March 9

Foundations for Systems Biology

(with BioSim)

Cafeteria open *8:15 - 19:30*

Symposium Foundations for Systems Biology – Methodology Lectures **8:30 - 10:00**

Chair: Jacky Snoep (Schrödinger Hall)

Chair's introduction 8:30 - 8:35

F-L01 **Carsten Carlberg** 8:35 - 9:20

Systems biology and genomic approaches to nuclear receptor signalling
(didactic lecture)

F-L02 **Carole Goble** 9:20 - 9:40

A pragmatic approach to sharing information amongst Systems Biology projects in Europe

F-L03 **Roger Brent** 9:40 - 10:00

Systems biology and genetic control of signal and information content in the yeast pheromone pathway

Drinks & pastries (Molden foyer) *10:00 - 10:20*

Symposium Foundations for Systems Biology – Tutorials (3 in parallel) **10:20 - 11:05**

(Schrödinger, Popper, Von Einem Halls**)**

Carsten Carlberg, Carole Goble, Roger Brent

Drinks (Molden foyer) *11:05-11:20*

Symposium Foundations for Systems Biology – Results Lectures & Discussion

Chair: Jacky Snoep (Schrödinger Hall) **11:20-12:30**

F-L02 **Carole Goble** 11:20 - 11:40

A pragmatic approach to sharing information amongst Systems Biology projects in Europe

F-L03 **Roger Brent** 11:40 - 12:00

Systems biology and genetic control of signal and information content in the yeast pheromone pathway

Chair's resumé & students posing issues – General discussion 12:00-12:30

Lunch (Hotel Alphof)/Lunch packages (Molden foyer) & Afternoon Break (Slopes) *12:30-16:30*

Drinks and pastries (Kunst foyer) *16:00-16:30*

Black **B**oard teaching / **C**omputer **P**racticals **16:30- 18:05**

Chairs: Ursula Kummer, Jacky Snoep & Edda Klipp

---------- BBCP Session 2a – Monday early (parallel) **16:30- 17:15**

BB-01 **David Fell** (Koestler room) 16:30- 17:15

An introduction to Metabolic Control Analysis – theory and applications

BB-02 **Jeroen Jeneson & Natal van Riel** (Von Hayek room) 16:30- 17:15

Systems physiology

BB-03 **Matthias Heinemann** (Schrödinger Hall) 16:30- 17:15

Everything about metabolism

CP-01 **Richard Adams et al.** (Popper room) 16:30- 17:15

Edinburgh Pathway Editor and SBSIVisual – tools for analysing and visualizing biological pathways

CP-02 **Marcel Schilling & Sebastian Bohl** (Von Einem room) 16:30- 17:15

Model building, parameter estimation and Identifiability analysis

---------- BBCP Session 2b – Monday late (parallel) **17:20- 18:05**

BB-04 **Douwe Molenaar** (Von Hayek room) 17:20-18:05

Vertical genomics: the how and why of regulation

BB-05 **Bas Teusink** (Schrödinger Hall) 17:20- 18:05

Flux balance analysis

CP-03 **Frank Bruggeman et al.** (Von Einem room) 17:20- 18:05

Modelling in cell biology

CP-04 **Ursula Kummer** (Koestler room) 17:20-18:05

Introduction to modelling

CP-05 **Katy Wolstencroft et al.** (Popper room) 17:20-18:05

Data management using Taverna, JWS Online and SABIO-RK

Drinks (Molden foyer) *18:05-18:20*

Symposium Foundations for Systems Biology – Short Talks & Discussion **18:20-19:25**

Chair: Jacky Snoep (Schrödinger Hall)

F-S01 **Hans-Werner Mewes** 18:20-18:35

Subject centric information integration using topic maps

F-S02 **Albert Sorribas** 18:35-18:50

The role of mathematical formalisms and experimental design in succesfullly building mathematical models from dynamic data

F-S03 **Mohammed I. Atari** 18:50-19:05

Structural identifiability in systems biology: pharmacokinetic modelling of the aldehyde dehydrogenase (ALDH) enzyme and the breast cancer resistance protein (BCRP/ABCG2) in drug resistance

Speaker's Panel addressing issues raised in the morning **19:05-19:25**

Dinner (Hotel Alphof) *19:30-21:00*

Drinks (Congress Centre's Kunst Foyer) *20:45-21:15*

Poster Session 2 **21:00-23:30**

Viewing posters	(Liechtenstein & Von Hayek Halls)	21:00-21:45
Free poster wandering	(Liechtenstein & Von Hayek Halls)	21:45-22:30
Bar poster discussions	(5 in parallel, presenters and teachers only)	22:30-23:30

*(**S**: Popper, **F**: Von Einem, **P**: Koestler, **G**: Von Hayek, **W**: Schrödinger)*

Bar (Kunst Foyer) *(cash or vouchers)* *21:15-23:30*

Monday's Poster Presentations (Liechtenstein & Von Hayek Halls)

Systems Biology in Space and Time

S-P02 Understanding hierarchical and metabolic regulation of metabolic networks through bayesian constraint modelling
***Jan Berkhout**, Barbara Bakker, Douwe Molenaar & Bas Teusink*

S-P05 Analyzing the HIV-human protein interaction network
***Gokhan Ertaylan**, David van Dijk & Peter Sloot*

S-P08 Activity of the glycolytic and nitrogen assimilation enzymes of *E. coli* under in vivo like conditions
***Rodolfo Garcia-Contreras**, Fred Boogerd & Hans V. Westerhoff*

S-P11 Design principles of nuclear receptor signalling: From model to model
***Alexey Kolodkin**, Frank J. Bruggeman, Martijn J. Moné, Barbara M. Bakker & Hans V. Westerhoff*

S-P14 Stem cells and brain cancer
***Marcel Mischnik**, Androniki Kharatanassi & Torsten Pietsch*

S-P17 Dynamical modeling of mitotic exit regulatory network
***Ahmed Rattani**, Orsolya Kapuy, Andrea Ciliberto & Bela Novak*

S-P20 Modeling the physiology of muscle cells in the context of the developing zebrafish myotome
***Fabian Rost**, Lutz Brusch, Andrew Oates & Andreas Deutsch*

S-P23 Generalised entropy based approximation to objective analysis of living cells´ culture state
***Dalibor Stys**, Jan Urban & Jan Vaněk*

S-P26 Network motifs in HIV-human protein interaction network
***David van Dijk**, Gokhan Ertaylan & Peter Sloot*

Foundations for Systems Biology

F-P02 Structural identifiability in systems biology: pharmacokinetic modelling of the Aldehyde Dehydrogenase (ALDH) enzyme and the breast cancer resistance protein (BCRP/ABCG2) in drug resistance
***Mohammed I. Atari**, Michael J. Chappell, Rachel J. Errington, Paul J. Smith & Neil D. Evans*

F-P05 Assessment of linear approximations on a benchmark model of carbon metabolism
***Matteo Brilli** & Daniel Kahn*

F-P08 Evolution and function of circadian clock proteins: lessons from bacteria
***Stefanie Hertel** & Ilka Axmann*

F-P11 Unravelling the secrets of the *Bacillus subtilis* Secretome – A systems biology approach (BaCell-SysMo)
***Laxmi Krishnappa**, Emma Denham, Sjouke Piersma, Eleni Tsompanidou & Jan Maarten van Dijl*

F-P14 Investigation of regulatory processes at the G1/S transition of the hepatocyte cell cycle by mathematical modeling
***Stephanie Müller**, Jeremy Huard & Ursula Klingmüller*

F-P17 Making models: a review of systems biology yeast models and their relevance to human disease
***Caroline Paget**, Edward Kent, Helen Kotze, Sharaz Mohammed & Paul Wilcock*

F-P20 Dynamic property analysis of the interferon alpha signaling pathway in human hepatocytes
***Annette Schneider**, Marcel Schilling, Tim Maiwald, Swen Rupp, Simone Rosenberger, Marco Binder, Ursula Kummer, Johannes Schlöder, Rainer Zawatzky, Ralf Bartenschlager & Ursula Klingmüller*

F-P23 Subgroup discovery approaches for analysis and knowledge discovery in chemical genomics
***Lan Umek**, Uros Petrovic & Blaz Zupan*

F-P26 Making models: a review of systems biology yeast models and their relevance to human disease
***Paul Wilcock**, Edward Kent, Helen Kotze, Sharaz Mohammed & Caroline Paget*

Proof of the Pudding

P-P02 Elementary mode analysis of the *Trypanosoma brucei* glycolytic pathway
***Emily Armitage**, Holly Summersgill, Suzanne Geenen & Peter Taylor*

P-P05 Adaptive evolution in the *Pseudomonas fluorescens* Wsp signaling pathway
Sam Farrell

P-P08 Responses of the fungal pathogens *Candida glabrata* and *Candida albicans* to combinatorial stresses
***Despoina Kaloriti**, George Coghill, Emily Cook, Neil A.R. Gow, Celso Grebogi, Ken Haynes, Piers Ingram, Megan Lenardon, Andy McDonagh, Alessandro Moura, Wei Pang, Maria C. Romano, Jaroslav Stark, Michael Stumpf & Marco Thiel*

P-P11 MicroOrganism Systems biology: Energy and *Saccharomyces cerevisiae* (MOSES)
***Femke I. C. Mensonides**, Malkhey Verma, Stephen Wilkinson, Douglas B. Kell, Karl Kuchler, Matthias Reuss, Peter Ruoff, Stefan Wölfl, Hans V. Westerhoff & Barbara M. Bakker*

P-P14 Qualitative reconstruction of the detoxification pathway of Methylglyoxal
Wei Pang, Alessandro de Moura, Ian Booth, Camila de Almeida, Celso Grebogi & George Coghill

P-P17 A multi skeletal computational model of human skeletal muscle to quantify metabolite dynamics in individual fiber types from 31P MRS measurements
***Joep P.J. Schmitz**, Natal A.W. van Riel, Jeroen A.L. Jeneson, Klaas Nicolay & Peter A.J. Hilbers*

P-P20 A systems biology approach to studying the effect of ROS on gene transcription networks and IL-1 expression
***Ben G. Small**, Barry W. McColl, Nancy J. Rothwell, Douglas B. Kell, Pedro Mendes & David Brough*

P-P23 Systematic improvement of metabolic network reconstructions using large-scale phenomics data
***Balazs Szappanos**, Balazs Papp & Csaba Pal*

P-P26 Variable energy: extracellular glucose fluctuations and the Teusink model
***Jie Yang** & Mark Walsh*

The Genome Alive

G-P02 Nucleoprotein interactions at the enterococcal *cenE* centromere
***Malgorzata Adamczyk**, Andrew Derome, Christian Hoischen, Malte Bussiek, Stephan Diekmann, Daniela Barilla & Finbarr Hayes*

G-P05 Systems analysis of DNA replication
***Anneke Bruemmer**, Carlos Salazar, Vittoria Zinzalla, Lilia Alberghina & Thomas Hoefer*

G-P08 Identification of Protein Profiles of *Escherichia coli, Staphylococcus aureus* and their corresponding phages
***Ayman Elshayeb**, Ashraf Yousif, Eshtiyag Abedalkareem, Salma El hag, Atif Elagib & Sanaa Yagoub*

G-P11 Computational Tools for System-level Analysis of Signalling Networks
***Guy Karlebach**, Idan Zohar, Irit Gat-Viks, Rita Vesterman, Dorit Sagir, Arnon Paz, Jackie Assa, Igor Ulitsky, Ran Elkon, Yosef Shiloh & Ron Shamir*

G-P14 Small RNAs Establish Delays and Temporal Thresholds in Gene Expression
***Michael Pereira**, Stefan Legewie, Dennis Dienst, Annegret Wilde, Hanspeter Herzel & Ilka Axmann*

G-P17 The population level transcriptional cycling arises from the timer-like nature of single cell transcription
***Katja N. Rybakova**, Tatjana Degenhardt, Aleksandra Tomaszewska, Martijn J. Moné, Hans V. Westerhoff, Frank J. Bruggeman & Carsten Carlberg*

G-P20 Cotrasif: genomics tool for systems biology
***Bogdan Tokovenko**, Rostyslav Golda, Oleksiy Protas & Maria Obolenskaya*

G-P23 Variable energy: extracellular glucose fluctuations and the Teusink Model
***Mark Walsh** & Jie Yang*

G-P26 FLUXOME profiling resolves the metabolic responses elicited by hypoxia and loss of VHL in renal cell carcinoma
***Dan Zheng**, Wilhelm Krek & Nicola Zamboni*

Making Systems W ork

W-P02 Optimizing growth rate, biomass and product formation of *Lactococcus lactis* by a systems biology approach
***Anisha Goel**, Douwe Molenaar, Barbara Bakker & Bas Teusink*

W-P05 More is better: ranking with multiple targets for biomarker discovery
***Dragi Kocev**, Ivica Slavkov & Saso Dzeroski*

W-P08 See abstract P20 of Small
Barry McColl

W-P11 Nested supply-demand analysis with PySCeS
***Brett G. Olivier**, Johann M. Rohwer & Jan-Hendrik S. Hofmeyr*

W-P14 Characterization of different promoters for designing a new bidirectional expression vector in *Saccharomyces cerevisiae*
*Siavash Partow**, Verena Siewers, Jerome Maury, Sara Bjørn & Jens Nielsen***

W-P17 Mapping the protein phosphorylation network that regulates metabolic activity in *Saccharomyces cerevisiae*
***Juliane Caroline Schulz**, Stéphanie Heux, Jennifer Ewald, Nicola Zamboni & Uwe Sauer*

W-P20 Cancer microarray data mining by concurrent visualization of gene networks and pathways
***Miha Stajdohar**, Minca Mramor, Tomaz Curk, Blaz Zupan & Janez Demsar*

W-P23 Search heuristics for SNP-SNP interaction discovery
***Marko Toplak**, Tomaz Curk & Blaz Zupan*

W-P26 Fat mobilization in yeast: quantitative modeling of triglyceride homeostasis
***Jürgen Zanghellini**, Klaus Natter, Christoph F Kurat, Sepp D Kohlwein & Hennig Grünberg*

Tuesday, March 10

The Proof of the Pudding:

Understanding biological function

(with UNICELLSYS)

Cafeteria open *8:15-13:00*

Symposium The Proof of the Pudding – Methodology Lectures **8:30-10:00**

Chair: Uwe Sauer (Schrödinger Hall)

Chair's introduction 8:30 - 8:35

P-L01 **Edda Klipp** & **Stefan Hohmann** 8:35 - 9:15

Yeast signaling pathways – integration of experimental measurements and mathematical modelling (didactic lecture)

P-L02 **Jean Beggs & Igor Goryanin** 9:15 - 9:30

RiboSys – systems biology of RNA metabolism in yeast

P-L03 **Luis Serrano** 9:30 - 9:45

How to build a metabolic map in a simple organism

P-L04 **Ruedi Aebersold** 9:45-10:00

Quantitative proteomics for cell signalling

Drinks and pastries (Molden foyer) *10:00-10:20*

Symposium The P roof of the P udding – Tutorials (4 in parallel) **10:20-11:05**

(Schrödinger, Popper, Von Einem & Koestler Halls**)**

Edda Klipp & Stefan Hohmann, Jean Beggs & Igor Goryanin, Luis Serrano, Ruedi Aebersold

Drinks (Molden foyer) *11:05-11:20*

Symposium The P roof of the P udding – Lectures on results **11:20-12:45**

Chair: Uwe Sauer (Schrödinger Hall)

P-L02 **Jean Beggs & Igor Goryanin** 11:20-11:40

RiboSys – systems biology of RNA metabolism in yeast

P-L03 **Luis Serrano** 11:40-12:00

Even simple is quite complicated

P-L04 **Ruedi Aebersold** 12:00-12:20

Protein modification matters

Chair's resumé & students posing issues – General discussion 12:20-12:45

Excursion and lunch packages (Molden foyer) and dinner (buses etc) *13:00-23:30*

Wednesday, March 11

The Genome alive

(with MCISB & DTC-ISBML, Systems X and NISB)

Cafeteria open *8:15-19:30*

Symposium The Genome alive **8:30-9:20**

Chair: Frank Bruggeman

Chair's introduction 8:30-8:35

G-L01 **Philippe Bastiaens** 8:35-9:20

Overview and Molecules in action *(didactic lecture)*

Drinks (Molden Foyer) *9:20-9:35*

Black Board teaching / Computer Practicals **9:35-10:20**

Chairs: Ursula Kummer, Jacky Snoep, Edda Klipp

---------- **BBCP Session 3a – Monday early** (Parallel)

BB-01 **David Fell** (Koestler room) 9:35-10:20

An introduction to metabolic control analysis – theory and applications

BB-02 **Jeroen Jeneson & Natal van Riel** (Von Hayek room) 9:35-10:20

Systems physiology

BB-03 **Matthias Heinemann** (Schrödinger Hall) 9:35-10:20

Everything about metabolism

CP-01 **Richard Adams et al.** (Popper room) 9:35-10:20

Edinburgh Pathway Editor and SBSIVisual – tools for analysing and visualizing biological pathways

CP-02 **Marcel Schilling & Sebastian Bohl** (Von Einem room) 9:35-10:20

Model building, parameter estimation and identifiability analysis

---------- **BBCP Session 3b – Monday late** (Parallel) **10:25 - 11:10**

BB-04 **Douwe Molenaar** (Von Hayek room) 10:25-11:10

Vertical genomics: the how and why of regulation

BB-05 **Bas Teusink** (Schrödinger Hall) 10:25-11:10

Flux balance analysis

CP-03 **Frank Bruggeman et al.** (Von Einem room) 10:25-11:10

Modelling in cell biology

CP-04 **Ursula Kummer** (Koestler room) 10:25-11:10

Introduction to modelling

CP-05 **Katy Wolstencroft et al.** (Popper room) 10:25-11:10

Data management using Taverna, JWS Online and SABIO-RK

Drinks and pastries (Molden foyer) *11:10-11:30*

Symposium The Genome alive – Short talks **11:30-12:30**

Chair: Frank Bruggeman **(**Schrödinger Hall)

G-S02 **Daniel Kahn** 11:30-11:45

A model for expression-dependent selection of metabolic gene dosage

G-S03 **Judit Zámborszky** 11:45-12:00

Computational analysis of effects of DNA damage response on circadian rhythms

P-S01 **Ines Heiland** 12:00-12:15

The role of phosphorylation in circadian rhythms

Chair's resumé & students posing issues – General discussion 12:00-12:30

Lunch (Hotel Alphof) / Lunch packages (Molden foyer) *& Afternoon Break (Slopes)* *12:30-16:30*

Drinks & pastries (Molden foyer) *16:00-16:30*

Symposium The Genome alive – Keynote lecture and debate **16:30-19:25**

Chair: Karl Kuchler

Keynote lecture

G-L02 **Denis Noble** 16:30 - 17:15

The virtual physiological human

Drinks (Molden foyer) *17:15-17:45*

G-L03 **Bruggeman, Goryanin, Henney, Mosekilde, Noble, Timmer, Westerhoff**

Debate – The silicon, virtual and digital humans 17:45-18:45

All

Writing the Alpbach comments 18:45-19:25

Dinner (Hotel Alphof) *19:30-21:00*

Drinks (Congress Centre's Kunst Foyer) *20:45-21:15*

Poster Session 3 **21:00-23:30**

Viewing posters (Liechtenstein & Von Hayek Halls) 21:00-21:45

Free poster wandering (Liechtenstein & Von Hayek Halls) 21:45-22:30

Bar poster discussions (5 in parallel, presenters and teachers only) 22:30-23:30

*(**S**: Popper, **F**: Von Einem, **P**: Koestler, **G**: Von Hayek, **W**: Schrödinger)*

Bar (Kunst Foyer) *(cash or vouchers)* *21:15-23:30*

Wednesday's Poster Presentations (Liechtenstein & Von Hayek Halls)

Systems Biology in Space and Time

S-P03 HepatoNet - network reconstruction, metabolic model and knowledgebase of human hepatocytes
***Christian Bölling**, Andreas Hoppe, Christoph Gille, Sabrina Hoffmann, Sascha Bulik, Katrin Hübner, Ramanan Ganeshan & Hermann-Georg Holzhütter*

S-P06 A hybrid model for protein translation
***Muhammad Ali Faisal**, Melih Kandemir & Antti Honkela*

S-P09 Correlation Analysis of Epileptic EEG
***Marc Goodfellow**, Gerold Baier & Kaspar Schindler*

S-P12 Making models: a review of systems biology yeast models and their relevance to human disease
***Helen Laura Kotze**, Edward Kent, Paul Wilcock, Caroline Paget & Sharaz Mohammed*

S-P15 Smad dynamics in osteoblast differentiation
***Martijn J. Moné**, Frank J. Bruggeman, Marco Eijken, Johannes P.T.M. van Leeuwen & Hans V. Westerhoff*

S-P18 Towards a transcription factor interaction network using MITOMI
***Sylvie Rockel** & Sebastian Maerkl*

S-P21 Making models: a review of systems biology yeast models and their relevance to human disease
***Mohammed Shahraz**, Paul Wilcock, Helen Kotze, Edward Kent & Caroline Paget*

S-P24 Modular modeling of human physiology
***Maciej Swat**, Frank Bruggeman, Barbara Bakker & Hans V. Westerhoff*

S-P27 Bisen: biochemical simulation environment
***Joep Vanlier**, Fan Wu, Feng Qi, Kalyan, C. Vinnakota, Yu Han, Ranyan, K. Dash, Jeroen, A. L. Jeneson, Natal, A. W. van Riel, Peter, A. J. Hilbers & Daniel A. Beard*

Foundations for Systems Biology

F-P03 ON/OFF – A boolean model of apoptosis
***Ima Avalos Vizcarra** & Rebekka Schlatter & Thomas Sauter & Oliver Sawodny*

F-P06 'Global' robustness in model discrimination for circadian oscillators
***Marc Hafner**, Heinz Koeppl, Martin Hasler & Andreas Wagner*

F-P09 Decisive noise: noisy intercellular signalling and decision making analysed and enforced through synthetic biology
***Victoria Jackson**, Maria Nardelli, Kieran Sharkey & Hans Westerhoff*

F-P12 Subject centric information integration using topic maps
Nenova Karamfilka , Volker Stümpflen & **H. Werner Mewes**

F-P15 Identifying the parameters of polynomial and rational systems
Jana Nemcova

F-P18 Modelling the cell cycle
***Angela M. M. O. Pisco** & Rui Dilão*

F-P21 The role of mathematical formalisms and experimental design in successfully building mathematical models from dynamic data.
Albert Sorribas

F-P24 A natural formalism for modelling dynamic biochemical systems
Jan Bert van Klinken

F-P27 Multi-layer networks for visualization of diverse systems biology data and knowledge sets
Lan Zagar, Miha Stajdohar, Janez Demsar, Tomaz Curk & Blaz Zupan

Proof of the Pudding

P-P03 Synthetic biology: systems biology 2.0
Stephen Checkley

P-P06 Elementary mode analysis of the *Trypanosoma brucei* glycolytic pathway
Suzanne Geenen*, Emily Armitage, Peter Taylor & Holly Summersgill*

P-P09 Modelling Wnt/beta-catenin-signalling: What determines the temporal behaviour of beta-catenin?
Bente Kofahl *& Jana Wolf*

P-P12 Towards quantitative description of yeast energy metabolism: high-throughput determination of kinetic properties of glycolytic enzymes
Hanan Messiha*, Naglis Malys, Stephen Wilkinson, Dieter Weichart, Farid Khan, Kieran Smallbone, Neil Swainston, Jill Wishart, Douglas Kell, Hans Westerhoff & Pedro Mendes*

P-P15 Construction and validation of a detailed kinetic model of glycolysis in the asexual *Plasmodium falciparum*
Gerald P. Penkler*, Marina Rautenbach & Jacky L. Snoep*

P-P18 Evidence for a less robust timing mechanism in *Prochlorococcus*
Luiza Seeliger*, Ilka M. Axmann & Annegret Wilde*

P-P21 Towards a full genome-scale kinetic model of yeast metabolism
Natalie Stanford*, Warwick Dunn, Pedro Mendes, Evangelos Simeonidis & Kieran Smallbone*

P-P24 Elementary mode analysis of the Trypanosoma brucei glycolytic pathway
Peter Taylor*, Emily Armitage, Suzanne Geenen & Holly Summersgill*

The Genome Alive

G-P03 Redirecting central carbon metabolism towards fermentation end products in the cyanobacterium *Synechocystis* PCC6803
S. Andreas Angermayr*, Kornel Golebski, M. Joost Teixeira de Mattos & Klaas J. Hellingwerf*

G-P06 Motif discovery in promoters of genes co-expressed and co-localized in myelopoiesis, by a novel computational framework
Alessandro Coppe*, Francesco Ferrari, Andrea Bisognin, Silvio Bicciato, Sergio Ferrari, Gian Antonio Danieli & Stefania Bortoluzzi*

G-P09 Conservation of high flux-control (HFC) genes of yeast following the whole-genome duplication
Michaela Clare Freeland*, Pnar Pir & Stephen G Oliver*

G-P12 Comparison of pH adaptation in *Aspergillus nidulans* and *Saccharomyces cerevisiae*: a modelling approach
Ruian Ke*, Jaroslav Stark & Ken Haynes*

G-P15 Is the Structural Classification of Proteins (SCOP) Evolutionarily Consistent at the Family Level?
Ralph Pethica *& Julian Gough*

G-P18 Genes – error prone or high fidelity?
Anne Schwabe *& Frank Bruggeman*

G-P21 Regulation of gene expression by peroxisome proliferator-activated receptors: from experiment to systems biology model
Aleksandra Tomaszewska, Ekaterina Rybakova, Frank Bruggeman, Carsten Carlberg

G-P24 Addressing Stat1 in human osteoblast differentiation
Viola Woeckel*, Marco Eijken, Bram van der Eerden & Hans van Leeuwen*

Making Systems  ork

W-P03 A system biology approach to study side-effects of statins in human
***Mateja Hafner**, Tadeja Režen, Juan A. Contreras, Peter Juvan, Katalin Monostory, Jean-Marc Pascuss & Damjana Rozman*

W-P06 Experimental and theoretical modelling of the mitogen activated protein kinase pathway
***Louise Maddison**, Nils Bluthgen, Hans V. Westerhoff & Claire Eyers*

W-P09 Heterologous expression of polyketides in fungi and optimization by using *in silico* analysis
***Louise Mølgaard**, Bjarne Gram Hansen, Uffe Mortensen & Kiran R Patil*

W-P12 *In Silico* Prediction of Growth Adaptation by Optimization Approaches
***Pinar Ozturk**, Bas Teusink, Douwe Molenaar & Barbara Bakker*

W-P15 Identifying molecular targets by creating global networks of functional coupling and computing their associated pathways
***Sanjit Roopra**, Andrey Alexeyenko & Erik Sonnhammer*

W-P18 Employing network interactions to reveal pathogenesis targets related to mycn gene amplification in neuroblastoma
***Nicholas Shipillis**, Fiona Salway, Hans V. Westerhoff & Philip J. Day*

W-P21 Algorithm for *in silico* optimisation of enzyme concentration proportions
***Egils Stalidzans**, Laura Lagzdina & Ivars Mozga*

W-P24 Getting more information from LC-MS using the stochastic systems approach
***Jan Urban**, Jan Vanek & Dalibor Stys*

Thursday, March 12

Making Systems Work

Cafeteria open *8:15– 19:30*

Symposium W: Making Systems Work – Methodology Lectures **8:30 - 12:30**

Chair: Adriano Henney (Schrödinger Hall)

Chair's introduction 8:30 - 8:35

W-L01 **Ron Weiss** 8:35 - 9:20

Synthetic biology: from programming bacteria to programming stem cells

(didactic lecture)

W-L02 **David de Graaf** 9:20 - 9:40

Systems Biology: applications in predictive toxicology and understanding the desired properties of antibody therapeutics

W-L03 **Sang Yup Lee** 9:40 - 10:00

Metabolic Engineering for successes

Drinks & pastries (Molden foyer) *10:00 - 10:20*

Symposium W: Making Systems Work – Tutorials (3 in parallel) **10:20 - 11:05**

(Schrödinger, Popper, Von Einem Halls)

Ron Weiss, David de Graaf, Sang Yup Lee

Drinks (Molden foyer) *11:05 - 11:20*

Symposium W: Making Systems Work – Results Lectures **11:20 - 12:30**

Chair: Adriano Henney (Schrödinger Hall)

W-L02 **David de Graaf** 11:20 - 11:40

Systems Biology: applications in predictive toxicology and understanding the desired properties of antibody therapeutics

W-L03 **Sang Yup Lee** 11:40 - 12:00

Metabolic Engineering: the successes

Chair's resumé & students posing issues – General discussion 12:00 - 12:30

Lunch (Hotel Alphof)/Lunch packages (Molden foyer) & Afternoon Break (Slopes) *12:30 - 16:30*

Drinks and pastries (Molden foyer) *16:00 - 16:30*

Symposium W: Making Systems Work – Short talks & Discussions **16:30 - 17:30**

Chair: Adriano Henney (Schrödinger Hall)

P -S02 **Gerald P. Penkler** 16:30 - 16:45

Construction and validation of a detailed kinetic model of glycolysis in the asexual Plasmodium falciparum

W-S01 **Neil Swainston** 16:45-17:00

Parameterisation of SBML models and visualization of experimental data through CellDesigner plugins

W-S02 **Minca Mramor** 17:00 - 17:15

The utility of gene sets for the analysis of cancer gene expression data

General discussion 17:15 - 17:30

Drinks and pastries (Molden foyer) *17:30 - 17:50*

Closing lectures: Making dynamic systems Work **17:50 - 19:15**

Chair: Karl Kuchler (Schrödinger Hall)

W-L04 **Erik Mosekilde** (University of Copenhagen) 17:50 - 18:15

Oscillatory phenomena in kidney autoregulation

W-L05 **Gerold Baier** (University of Manchester) 18:15 - 18:40

Listening to the Epileptic Brain – a new approach to dynamics in space and time

W-L06 **Peter Tass** 18:40 - 19:15

Anti-system biology: long lasting therapeutic effects of desynchronizing brain stimulation

Banquet and Farewell Party (Hotel Alphof) *19:30 - 25:00*

All Systems running: Farewell Party (Hotel Alphof) **21:00 - …**

Presentation of "FEBS SysBio Young SysBio investigator awards" 21:30 - 21:45

Anneke Koster & Emilia Westerhoff & Hans V. Westerhoff

Official Course Closure 21:45 - 21:50

Hans V. Westerhoff & Karl Kuchler

Friday, March 13

The day after	
Cafeteria open (Congress centre)	*9:00 - 12:00*
Check-out (accommodation) and departure	7:00 - 10:00
Shuttle buses from Congress Centre to Innsbruck airport and to Railway Station Wörgl (details to be announced and as desired)	*7:00 – 12:00*