

# Les Houches school “Evolution of Diversity” Program

Feb 25 Sunday (The site is open from 3pm)

19:30- Dinner

Feb. 26 Monday

7:45-8:40 Breakfast

8:40-8:45 Welcome, practical information

8:45-9:15 Ulrich Gerland, How can physics help to get evolution started?

9:15-9:45 Chikara Furusawa, Phenotypic diversity and constraints in microbial adaptive evolution

9:45-10:15 Seppe Kuehn, Constraints on phenotypes and populations

10:15-11:00 Coffee break

11:00-11:30 Hiroyuki Noji, Directed evolution by femtoliter reactor array technology

11:30-12:00 Irene Chen, Fitness landscapes of RNA

12:30- Lunch break

17:30-18:00 Yannick Rondelez, Randomly compartmentalized replicators

18:00-19:00 poster

19:00 -19:30 Welcome drink

19:30- Dinner

Feb. 27 Tuesday

7:45-8:45 Breakfast

8:45-9:15 Philippe Nghe, Local and global evolutionary constraints in regulatory networks

9:15-9:45 Ala Trusina, How celler polarity leads to emergence of complex shapes

9:45-10:15 Simone Pigolotti, Energetic funnel facilitates facilitated diffusion

10:15-11:00 Coffee break

11:00-11:30 Tetsuya Kobayashi, Linking the single-cell-level division processes to the population-level growth

11:30-12:00 Matteo Smerlak, Universal fitness distributions

12:30- Lunch break

17:45-18:15 Erwin Frey, Ecological feedback and Biodiversity

18:15-18:45 Hong-Yan Shih, Collective emergent state between marine bacteria and viruses

18:45-19:15 Jan Haerter, Theory for invasion extinction dynamics in food webs

19:30- Dinner

Feb. 28 Wednesday

7:45-8:45 Breakfast

8:45-9:15 Armita Nourmohammad, coevolution of the adaptive immune system with pathogens

9:15-9:45 Luca Peliti, Selection dynamics in transient compartmentalization  
9:45-10:15 Mogens H. Jensen, Mode-Hopping and Arnold Tongues in Cell Dynamics  
10:15-11:00 Coffee break  
11:00-11:30 Thierry Mora, Prediction and evolution of optimal immune repertoires  
11:30-12:00 Tsvi Tlusty, Green functions of correlated genes the mechanical evolution of protein  
12:30- Lunch break  
17:45-18:15 Kunihiro Kaneko, Macroscopic Theory of Phenotypic Adaptation and Evolution: Fluctuation-Response, Genetic Assimilation, and Dimension Reduction  
18:15-19:15 poster  
19:30- Dinner

## Mar. 1 Thursday

7:45-8:45 Breakfast  
8:45-9:15 Sergei Maslov, Diversity, stability and reproducibility in microbial ecosystems: stable marriage approach  
9:15-9:45 Michael Lässig, Evolutionary principles governing molecular diversity  
9:45-10:15 Stefan Bornholdt, Toy models for diversity in evolution  
10:15-11:00 Coffee break  
11:00-11:30 Nicholas Croucher, What determines the distribution of genomic islands?  
11:30-12:00 Martin Weigt, From observable sequence diversity to statistical protein design  
12:30- Lunch break  
17:45-18:15 Marco Cosentino Lagomarsino, Shared genes in genomes and ecosystems.  
18:15-18:45 Sandeep Krishna, The chemical basis of metabolic interdependence  
18:45-19:15 Martin Howard, Long-term sensing and memorising of fluctuating cold-temperatures  
19:30- Dinner

## Mar. 2 Friday

7:45-8:45 Breakfast  
8:45-9:15 Simona Cocco, Extracting features from protein sequence data with Restricted Boltzmann Machines  
9:15-9:45 Bahram Houchmandzadeh, Neutral Beta diversity in finite genome length.  
9:45-10:30 Coffee break  
10:30-11:00 Clément Nizak, Hierarchy and extremes in selections from pools of randomized proteins  
11:00-11:30 Namiko Mitarai, Bacteria vs. Phage: The art of war among the unseen majority.  
11:30-11:35 Closing  
12:30- Lunch break  
Leaving

# Posters

(Write to the organizers to add your poster title below, if it is not already there)

Gabriel Birzu	Dynamics of diversity loss reveal a new class of reaction-diffusion waves
Ayan Biswas	Linking Network Structure With Functionality: Lessons From Information Theory
Alex Blokhuis	Selection Dynamics in Transient Compartmentalization
Guilhem Doucier	The evolutionary origins of heredity during major egalitarian transitions in individuality
Philipp Geiger	Family-friendly zero-sum games
Tetsuhiro Hatakeyama	A quantitative law of homeostasis in the gene regulatory network through the evolutionary process
Martina Iapichino	Bacterial Biofilm Response to Gradients in their physical environment
Gorm Gruner Jensen	Social Evolution of Structural Discrimination
Jonas Sogaard Juul	Somite patterning through phase drift between stem cell oscillators
Andrea Kadović	Percolation Theory for Color Diversity on Random Networks
Masashi Kajita	Stochastic modeling for T cell ligand discrimination
Cecilia Lövkvist	Spatiotemporal modelling of DNA methylation in mammals.
Heng LU	Chemical fitness
Yoshiya Matsubara	Conditions for selecting complex sequences in self-replicating template polymer system
David Muramatsu	Does Chemotaxis Influence Homeostasis in the Thymus?
So Nakashima	EM based algorithm to infer both phenotypic state and cell division properties from lineage information
Basile Nguyen	Thermodynamic Bounds on the Ultra- and Infra-affinity of Hsp70 for Its Substrates
Silas Boye Nissen	Cellular polarity is sufficient to enable robust morphological complexity in development

Kenji OKUBO	Robustness and Genetic Load of Gene Regulatory Network in Recombining Diploids
Huixia Ren	Oscillation Patterns in Islets
Marco Ribezzi Crivellari	A microfluidic approach to helicase biophysics
Elena Tea Russo	Towards unsupervised protein domain recognition
Steven Schulz	Quantifying and Controlling Polyreactivity in Evolving Antibodies
Rasmus Skytte Eriksen	A Growing Microcolony can Survive and Support Persistent Propagation of Virulent Phages
Masahiko Ueda	Dynamical phase transition in population genetics models with evolving mutation rate
Aleksandra Walczak	Immune response of repertoires
Tong Wang	CRISPR model of phage-bacterial coevolution
Jumpei Yamagishi	Promotion of cellular growth by leakage of chemical components and its impact on symbiosis
Vinko Zlatic	Critical exponents of color avoiding percolation
Remi Monasson	Emergence of compositional regime in restricted Boltzmann machines
Mathias Liudour Heltberg	Modehopping in Biological Oscillators