

DYNALIFE



80, 70, 20 Conference

Towards Excellence and

Convergence Research

in Theoretical Biology

2-4 May 2023

Aula Magna Trentin

Ca' Foscari University

Ca' Dolfin, Venice · IT

ABOUT DYNALIFE

In the mid-twentieth century two new scientific disciplines emerged forcefully: molecular biology and information-communication theory. At the beginning cross-fertilisation was so deep that the term genetic code was universally accepted for describing the meaning of triplets of mRNA (codons) as amino acids. However, today, such synergy has not taken advantage of the vertiginous advances in the two disciplines and presents more challenges than answers. These challenges are not only of great theoretical relevance but also represent unavoidable milestones for next generation biology: from personalized genetic therapy and diagnosis, to artificial life, to the production of biologically active proteins. Moreover, the matter is intimately connected to a paradigm shift needed in theoretical biology, pioneered long time ago in Europe, and that requires combined contributions from disciplines well outside the biological realm. The use of information as a conceptual metaphor needs to be turned into quantitative and predictive models that can be tested empirically and integrated in a unified view. The successful achievement of these tasks requires a wide multidisciplinary approach, and Europe is uniquely placed to construct a world leading network to address such an endeavour. The aim of this Action is to connect involved research groups throughout Europe into a strong network that promotes innovative and high-impact multi and inter-disciplinary research and, at the same time, to develop a strong dissemination activity aimed at breaking the communication barriers between disciplines, at forming young researchers, and at bringing the field closer to a broad general audience.

COST (European Cooperation in Science and Technology) is a funding agency for research and innovation networks. Our Actions help connect research initiatives across Europe and enable scientists to grow their ideas by sharing them with their peers. This boosts their research, career and innovation.

SCIENTIFIC COMMITTEE

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Julyan Cartwright (CSIC-IACT Granada)
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Greta Goracci (Free University of Bozen-Bolzano)
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TUESDAY, 2 MAY 2023

08:00 – 09:00	REGISTRATION WELCOME AND	12:00 – 12:15	SC3 Alexander Monzon (University of Padova, Italy) Non-globular proteins in the era of Machine Learning
09:00 – 09:10	INTRODUCTION	12:15 – 13:30	BREAK
09:10 – 09:55	PLENARY LECTURE 1 Achille Giacometti (University Ca' Foscari, Venice, Italy) Statistical Mechanics of Self-Assembly Processes	13:30 – 14:30	MC MEETING
09:55 – 10:20	LC1 Diego Luis Gonzalez (IMM-CNR, Italy) Why DYNALIFE?	14:30 – 14:55	LC4 Greta Goracci (Free University of Bozen- Bolzano, Italy) Dichotomic Classes and Entropy Optimization in Coding Sequences
10:20 – 10:40	BREAK	14:55 – 15:10	SC4 Sonja Grubisic (University of Belgrade, Serbia) Parameterization and valida- tion of an accurate force-field for molecular dynamics simulations of biomolecular systems
10:40 – 11:05	LC2 Lutz Strüngmann (University of Applied Sciences Mannheim, Germany) Circular Codes in the Genetic Information	15:10 – 15:55	PLENARY LECTURE 2 Paul Davies (Arizona State University, USA) The Demon in the Machine: how hidden networks of information are solving the mystery of life
11:05 – 11:20	SC1 Alessandra Ferlini (University of Ferrara, Italy) Codon usage in rare disease genes shows evolution- and phenotype-driven codon bias fingerprints	15:55 – 16:15	BREAK
11:20 – 11:45	LC3 Simone Giannerini (University of Bologna, Italy) A role for circular code prop- erties in translation	16:15 – 16:40	LC5 Andrei Khrennikov (Linnaeus University, Sweden) What is life?: Open quantum systems approach
11:45 – 12:00	SC2 Ádám Kun (Eötvös University, Hungary) Information theoretic view of the genetic code		

15:35 – 15:50	SC9 Eliana Ibrahim (University of Tirana, Albania) Statistical challenges and solutions in human microbiome data analysis	18:10 – 18:25	SC11 Stefano Piotto (University of Salerno, Italy) The ceteris paribus dilemma: medicinal chemistry struggling with complex systems
15:55 – 16:15	BREAK	THURSDAY, 4 MAY 2023	
16:15 – 16:40	LC12 Jeanine Houwing-Duistermaat (Radboud University Nijmegen, The Netherlands) Joint modelling of multiple omics datasets and outcome variables	08:30 – 09:00	REGISTRATION
		09:10 – 09:55	PLENARY LECTURE 4 Michael Russel (Research Scientist, Italy) Fougerite/Green rust: A mineral with aptitude
16:40 – 17:05	LC13 Davide Ferrari (Free University of Bozen-Bolzano, Italy) Sparse high-dimensional covariance matrix estimation by composite likelihood truncation with applications to large-scale gene association recovery	09:55 – 10:20	LC16 Steen Rasmussen (University of Southern Denmark, Denmark) Combinatorial co-factor, energy transduction, and the origin of functional information
		10:20 – 10:40	BREAK
17:05 – 17:30	LC14 Sofya Titarenko (University of Leeds, UK) Fast search for associations in genetic datasets	10:40 – 11:05	LC17 Nevena Ilieva (Bulgarian Academy of Sciences, Bulgaria) Charge and biological function: a peptide story
17:30 – 17:55	LC15 Michel Planat (CNRS, Université de Franche-Comté, France) Algebraic geometry of disease: the microRNA world	11:05 – 11:30	LC18 Jerzy Gorecki (ICHF PAN, Poland) Computing with a network of interacting chemical oscillators
17:55 – 18:10	SC10 Musa Kavas (Ondokuz Mayıs University, Turkey) The dynamics of flowering under heat stress: interaction between genes, miRNAs, circRNAs and lncRNAs	11:30 – 11:55	LC19 Oreste Piro (Universidad de las Islas Baleares (UIB), Spain) Chaotic neural spiking as a candidate for coded inter-neural communication

11:55 – 12:20	<p>LC20 Iván Marqués Campillo (Universidad de las Islas Baleares (UIB), Spain) Hydrodynamic coupling in the absence of inertia: the first intercellular communications</p>	15:15 – 15:30	<p>SC14 Pamela Knoll (University of Edinburgh, UK) Distinguishing Biological versus Abiotic Mineral Structures</p>
12:20 – 13:30	<p>BREAK</p>	15:30 – 15:55	<p>LC24 Herbert Huppert (Cambridge University, UK) A marriage between Biology and the Environmental Sciences</p>
13:30 – 13:55	<p>LC21 Tomislav Stankovski (Ss Cyril and Methodius University in Skopje, North Macedonia) Inference of coupling functions between interacting dynamical systems</p>	15:55 – 16:15	<p>BREAK</p>
13:55 – 14:10	<p>SC12 Ignacio Sainz-Diaz (CSIC-UGR, Spain) Role of mineral surfaces into the emergence of Life</p>	16:15 – 16:40	<p>LC25 Slobodan Zdravkovic (University of Belgrade, Serbia) One point of view on DNA-RNA transcription</p>
14:10 – 14:35	<p>LC22 Vladimir Jaćimović (University of Montenegro, Montenegro) Geometric bounds on information flows in evolutionary dynamical systems</p>	16:40 – 16:55	<p>SC15 Antti Niemi (Nordita, Stockholm University and Uppsala University, Sweden) From Feynman's ratchet to time crystalline molecular motors</p>
14:35 – 14:50	<p>SC13 Donato Giovannelli (University of Naples "Federico II", Italy) Oxidoreductases, trace elements and the evolution of biogeochemistry</p>	16:55 – 17:00	<p>CLOSING</p>
14:50 – 15:15	<p>LC23 Ikkbal Agah Ince (University Medical Center Groningen, The Netherlands) Spatial host genome re-arrangement in influenza infection</p>	17:00 – 18:00	<p>CORE GROUP MEETING</p>

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