PhD position in Origin of Life

Fully funded PhD position

The National Centre of Competence in Research NCCR Genesis is a research infrastructure project funded by SNSF focussing on exploring the emergence of life in the Universe. This interdisciplinary research infrastructure brings together physicists, earth and planetary scientists, chemists and biologists to understand the conditions and the mechanisms that enable life to emerge. Developing reliable methods to detect reliable traces of life (biosignatures) – whether through remote sensing or direct onsite measurements – requires significant innovation. These challenges demand close collaboration across physics, biology, chemistry and the earth sciences. NCCR Genesis does not aim to provide answers in all fields, but to drive innovative research and achieve decisive progress. Details on NCCR Genesis are available on its website https://nccr-genesis.ch. NCCR Genesis is deeply committed to equality, diversity and inclusion. Our aim is to cultivate a respectful and fair work culture with equal access to professional development and support for all. We strongly encourage applications from under-represented groups.

We are seeking a full-time PhD student to join the Environmental Fluid Mechanics laboratory at UNIL (led by Professor Pietro de Anna, at the Institute of Earth Science) and the Laboratory of Statistical Biophysics at EPFL (led by Professor Paolo De Los Rios, at the Institute of Physics). This post is fully founded (gross salary of about 55,000 CHF per year) by the Swiss National Science foundation (NCCR Genesis).

Desired profile

Master degree (or be near completion) in Physics or Mechanical Engineering or Civil & Environmental Engineering or Chemical Physics/Physical Chemistry or related discipline with a good understanding of at least one of the following topics: i) chemical physics, ii) statistical mechanics, iii) transport phenomena (dispersion, mixing and reactive transport), iv) microfluidics and video-microscopy. Written and spoken English are required, but working knowledge of French (the local language in Lausanne) is not necessary. Commitment to research based on experimental, numerical and modeling approaches.

Description of responsibilities

The successful candidate will work on a PhD thesis on chemical reaction networks in controlled and structured environments. This will be achieved by developing novel microfluidics devices to understand how non-equilibrium and non-homogeneous environments influence the network kinetics and the consequent abundance of reaction products. The physical and chemical properties will be tuned independently. Using pumps, pressure controllers and time-lapse video-microscopy, flow experiments through microfluidics structures will be performed to quantify the local reaction kinetics. Experimental results will be compared with theoretical models based on reaction-diffusion equations. The candidate will be trained in cutting-edge microfluidics and numerical models. The research work will involve collaborations with a suite of international colleagues across Europe and the US. Most of the PhD student's time will be dedicated to research, but contributing to some teaching activities can be discussed, including the additional possibility of supervising master students. **Expected start date position: 01.09.2026 or upon mutual agreement. Contract duration up to 4 years**.

The host facilities

The **Environmental Fluid Mechanics Laboratory** is an established facility, located at the Institute of Earth Sciences (ISTE) at the University of Lausanne, equipped with state-of-the-art technology including fully

automated microscopes, dedicated clean room for micro-fabrication and a microbiology laboratory. The University of Lausanne is sharing the campus with EPFL, making the local environment very dynamical and stimulating. More information about the Environmental Fluid Mechanics Laboratory can be found at www.pietrodeanna.org. The **Laboratoriy of Statistical Biophysics** (LBS), at the Institute of Physics and Institute of Bioengineering of EPFL, studies how biological and prebiotic molecular systems organize, maintain and remodel matter away from thermodynamic equilibrium. We combine statistical physics, polymer theory, kinetic modeling, reaction-network theory, bioinformatics, machine learning and experiments to connect molecular mechanisms with emergent organization across scales. A major focus is protein homeostasis, in particular how molecular chaperones such as Hsp70 use ATP to generate forces, reshape protein conformational ensembles, reverse aggregation and stabilize the proteome under stress. In parallel, we study non-equilibrium chemical reaction networks, asking how fluxes, gradients, interfaces and spatial heterogeneity can bias chemical pathways and promote the emergence of complex molecular products. More information about the Laboratory of Statistical Biophysics can be found at http://lbs.epfl.ch .

Application documents: i) motivation letter (1 page describing your background, research interests and past experience); ii) Curriculum vitae; iii) Contact information for one or two professional references.

The application documents must be submitted as a single PDF file here. Candidatures will be considered as soon as they will be received. Any questions can be directed to Prof. Pietro de Anna (pietro.deanna@unil.ch) or Paolo De Los Rios (paolo.delosrios@epfl.ch).