



Università  
Ca'Foscari  
Venezia

**PROJECT ACRONYM AND TITLE:** EMPHABIOSYS – Emergence of New Phases in Biopolymer Systems

**FUNDING PROGRAMME:** H2020

**CALL:** H2020-MSCA-IF-2019-Global fellowship

**KEYWORDS:** protein folding; coarse-grained models for proteins and protein-DNA interactions; Monte Carlo simulations; Molecular Dynamics; computational biophysics

**HOST DEPARTMENT:** Department of Molecular Sciences and Nanosystems

**SCIENTIFIC RESPONSIBLE:** Prof. Achille Giacometti

**FELLOW:** Dr. Tatjana SKRBIC

**FINANCIAL DATA:**

Project total costs	Overall funding assigned to UNIVE
€ 269.002,56	€ 269.002,56

**ABSTRACT:**

The aim of the project is to understand proteins, the molecular machines of life, using a highly interdisciplinary approach encompassing biology, chemistry, computer science, physics, and mathematics. Our work will be directly relevant to tackle the societally important problem of human health, it will be useful for making nifty machines in the lab and eventually could form the basis for the creation of artificial life itself. The starting ingredient of the EMPHABIOSYS project is a model for proteins recently developed by the applicant and her supervisors that serves to bridge conventional polymer phases and those adopted by biomolecules. We will proceed with a hierarchical inclusion of increasing levels of details that is fully controlled and will provide invaluable insights on the underlying mechanisms and direct comparison to experiments. We will incorporate directional interactions mimicking hydrogen bonds; we will include sequence specificity to understand the selection of the native state structure and the propensity of proteins to form amyloid implicated in debilitating diseases; we will then proceed to an understanding of the dynamics of protein folding and misfolding; and ultimately to the study of protein-DNA interactions. The first two steps will be carried out at University of Oregon under the guidance of international leaders and will enable me to master experimental approaches along with mathematical rigor and physical intuition. The final step will be carried out during the third year of the project at Ca' Foscari University of Venice and will benefit from the network of collaborations established with the Universities of Vienna, San Sebastian and Oslo. The award of the fellowship will be crucial for me to establish my scientific career, to communicate the joy of doing science, to inspire and mentor the next generation of young women (and men) to become scientific leaders, and to make our world a better place in the spirit of Marie Curie.

Planned Start date	Planned End date
15 <sup>th</sup> June 2020	14 <sup>th</sup> June 2023