Post-doctorate in immersive scientific visualization of omic data. (M / F)

Project description

The LBT has developed original tools for visualization and analysis of protein structures, focusing on advanced environments such as virtual reality helmets and display walls. This project aims to apply and improve the Unitymol approach to computational analysis, visualization and modeling of redox signal networks. The aim of this project is to develop an interactive bioinformatics tool for the visualization of huge proteomic datasets of redox signaling networks. These will be made intelligible through a large and high-resolution visualization wall to analyze network dynamics, based on quantitative and time-resolved proteomic technology that allows detection of nitrosylation and glutathionylation. Structural interpretations will be enabled by an automated modeling pipeline linking to various human mitochondrial diseases. We are seeking a highly motivated candidate to develop and implement a **next generation bioinformatics visualization platform**. The candidate will develop a tool for modeling the 3D structure of all modified proteins of the target organism, the alga Chlamydomonas Reinhardtii. The generated data will be integrated into the visualization of the redox networks. We will achieve this through a graphical representation of the redox system and its evolution over time, with the ability to explore connections between different systems. The foundations for the project have already been laid (see e.g. UnityMol), so we have a well-defined framework to get started. This position is a unique training opportunity in a multidisciplinary environment that brings together several leading groups in academic research.

Some literature references linked to the project:

[1] Maes et al., J Integrative Bioinformatics (2018) 15, 20180006 PDF VERSION

[2] Lv et al., PLOS One (2013), 8(3): e57990 PDF VERSION

[3] Martinez & Baaden, Acta Cryst D (2021), D77, 746-754 PDF VERSION
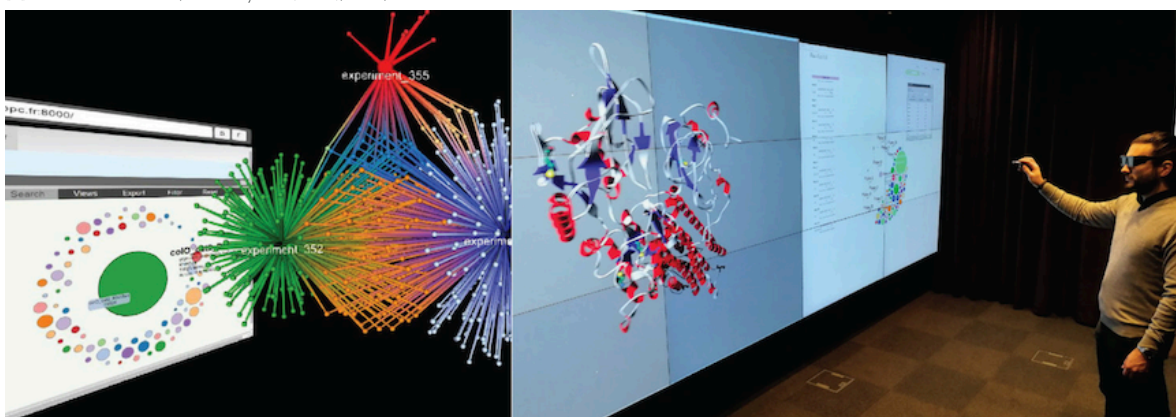
Activities

- Development of ideas and prototypes for the immersive study of redox networks and modified cysteine sites
- Development and implementation of this application in the UnityMol project, based on the Unity3D game engine.
- Application of the developed tool to concrete biological cases using the virtual reality material and the existing 3D image wall.
- write scientific articles for international peer-reviewed journals

Skills knowledge:

- General knowledge of the combination of computer science and biology (bioinformatics, biophysics or chemistry).
- In-depth knowledge of molecular modeling and / or scientific / molecular visualization.
- Proficiency in scientific English (reading and writing)
- Basic knowledge of virtual reality
- Experience with game engines and similar development environments is an advantage
- Knowledge in the field of omics is an advantage

know-how

- Design and implementation of scientific software.
- Software programming and technical skills to manage developments well (tools like git, doxygen,...).
- Information analysis and retrieval skills (keeping a lab notebook, preparing results tables, preparing oral presentations).
- Preparation of articles for publication in international peer-reviewed journals.

skills
- work in a team, especially in multi-laboratory collaboration
- organise and plan your work independently;
- present results in the form of clear and detailed scientific reports.

Context Most of the work will be carried out in the laboratory of Theoretical Biochemistry, a UPR 9080 unit of the CNRS led by Marc Baaden at the Institute of Physico-Chemical Biology in Paris, with regular exchanges with our partners at the University of Paris and Sorbonne University. Just over 29 people, including 15 statutory members, work in this laboratory, which is located in the heart of Latin Quarter. The project is led by Marc Baaden and Antoine Taly. The dual academic and industrial aspects are discussed. High quality material (virtual reality helmets, advanced display walls,...) will be provided. The work will be carried out in a multidisciplinary team.

Salary between 2,140 € and 3,954 € gross monthly according to experience

Research facilities: This LBT CNRS research unit is located in central Paris and conducts research on scientific visualization and computational biology. LBT participates in Equipex and Labex excellence in science programs. As part of the **CACSICE Equipex** , the candidate will have access to a **large high-resolution display wall**.

About the host institute: The "Institut de Biologie Physico-Chimique" was created in 1930 by the Foundation Edmond de Rothschild. It is associated with the **CNRS** (Centre National de la Recherche Scientifique), a leading international scientific institution offering an exceptional environment to scientists early in their career, with a dynamic international exposure animated by regular seminars and meetings.

Qualification and experience: A PhD or engineer degree in relevant fields (Computer Science, Visualization, Biophysics/Bioinformatics,..) and at least one publication in a peer reviewed journal or at a leading conference are required. The successful applicant should have excellent developer skills and a strong background in software development (graphics, shader programming, real time applications) with significant experience either in 3D visualization or in modelling, animation or game design software (Unity, Blender, Unreal). The candidate should also be familiar with at least one modern programming language. Evidence of the ability to undertake advanced software development is essential, as are good communication and organizational skills.

Executive summary:

When? 18 months starting ASAP

Where? Laboratoire de Biochimie Théorique, Paris, France.

Salary: between 2,140 € and 3,954 € gross monthly according to experience / the candidate's CV (amount indicated is before tax)

Team Leader: Marc Baaden - Follow @baam93 - [in] View Marc Baaden's profile

Websites:
- http://www.baaden.ibpc.fr
- http://unitymol.sourceforge.net