Florian E. C. Blanc, PhD

CNRS RESEARCH SCIENTIST IN COMPUTATIONAL MOLECULAR BIOPHYSICS

✉ florian.blanc@isa-lyon.fr | French | November 19, 1990 | ⌂ https://flblanc.github.io

Research interests

Protein dynamics, molecular machines & motors, integrative MD simulations, free energy calculations, machine learning, statistical mechanics

Current position

CNRS Research Scientist   *Villeurbanne (Lyon), France*

Biophysics of Complex Systems team - Institut des Sciences Analytiques   As of October 2024

Permanent independent position.

Research experience

Post-doctoral researcher   *Villeurbanne (Lyon), France*

Biophysics of Complex Systems team - Institut des Sciences Analytiques   September 2023 - September 2024

Integrative molecular modelling of bacterial silver-resistance proteins
Advisors: Olivier Walker, Maggy Hologne

Post-doctoral researcher   *Frankfurt am Main, Germany*

Department of Theoretical Biophysics - Max-Planck Institute of Biophysics   May 2019 - August 2023

Computational study of ATPase molecular machines
Advisor: Gerhard Hummer

Post-doctoral researcher   *Strasbourg, France*

Molecular Function and Design team - Université de Strasbourg   October 2018 - March 2019

Computational investigations of functional transitions in biological and artificial molecular machines
Advisor: Marco Cecchini

PhD candidate   *Strasbourg and Paris, France*

Molecular Function and Design team - Université de Strasbourg; Structural Motility team - Institut Curie   September 2014 - September 2018

Exploring chemo-mechanical transduction in the myosin molecular motor through computer simulations
Advisors: Marco Cecchini, Anne Houdusse

Collective responsabilities

Elected Post-doc representative   *Frankfurt-am-Main, Germany*
Max Planck Institute of Biophysics   November 2020 - August 2023

Education

PhD in Theoretical and Computational Chemistry   *Strasbourg and Paris, France*
Institut de Sciences et d'Ingénierie Supramoléculaires / Université de Strasbourg / Institut Curie   September 2014 - September 2018
Highest rating ("exceptional") on all evaluation criteria.

MSc in Bioinformatics   *Paris, France*
Université Paris-Diderot   September 2013 - June 2014
With high honours.

École Normale Supérieure Diploma in Biology (major) and Physics (minor)   *Paris, France*
École Normale Supérieure (ENS)   September 2010 - June 2014

Admission to ENS - Biology Department
Nationwide competitive entrance evaluation - rank: 1. Admitted to ENS with the status of paid civil servant (élève-normalien).   July 2010

Classes Préparatoires BCPST   *Marseille, France*
Preparatory classes for nationwide competitive admission exams to French "Grandes Écoles" - 2-year intensive training in biology, chemistry, physics, Earth sciences and mathematics   September 2008 - June 2010

Baccalauréat Scientifique   *Toulon, France*
French High-School diploma, scientific specialization   June 2008
With highest honours.

Skills

Communication	Oral and written scientific communication
Languages	French (native), English (fluent), German (A1.2)
Programming	Python/SciPy, bash, Fortran 90 (basic knowledge), Tcl (basic knowledge)
Molecular Simulations	Molecular Dynamics, free energy calculations, enhanced sampling, quantum chemistry
Machine Learning	Generative deep learning, dimensionality reduction, clustering

Teaching duties

Qualification Universitaire (2020-2028) in Sections 31 (Theoretical, Physical, Analytical Chemistry) and 64 (Biochemistry, Molecular Biology)

Computational Drug Design
Frankfurt University

Frankfurt-am-Main, Germany
2020-2021 Winter semester

Prepared and gave a 12 hour lecture series on **Advanced Simulation Methods for Drug Design**
Invited a guest lecturer from the private sector
Supervised and graded practicals and student presentations

Temporary teacher (physical and computational chemistry)
Université de Strasbourg

Strasbourg, France
September & November 2017

Taught a 1-week tutorial class on **Mathematical Methods for Chemistry** to first-year physical chemistry undergraduates
Gave a 2-hour **Statistical Mechanics** lecture in the Chemoinformatics Master program
Supervised a 4-hour lab session on **Normal Mode Analysis** in the Chemoinformatics Master program

Temporary teacher (bioinformatics)
Institut Supérieur des Biosciences

Noisy le Grand, France
December 2014 & December 2015

Supervised a 8-hour lab session on **Biomedical Signal Acquisition and Processing**

Volunteer mentor for high-school students
TalENS (ENS student association for high-school student mentoring)

Paris, France
September 2010 - June 2014

Mentored and taught scientific concepts to high-school students
Designed transdisciplinary scientific classes

Publications

A weak coupling mechanism mediates the recovery stroke of myosin VI: A free energy simulation and string method analysis
Florian E.C. Blanc*, Anne Houdusse, Marco Cecchini* (* corresponding authors)
PLOS Computational Biology, 2024
`https://dx.plos.org/10.1371/journal.pcbi.1012005`

Mechanism of proton-powered c-ring rotation in a mitochondrial ATP synthase
Florian E.C. Blanc, Gerhard Hummer
PNAS, 2024
`https://www.pnas.org/doi/10.1073/pnas.2314199121`

Molecular mechanisms of inorganic-phosphate release from the core and barbed end of actin filaments
W. Oosterheert*, F. E. C. Blanc*, A. Roy, A. Belyy, M. Boiero Sanders, O. Hofnagel, G. Hummer, P. Bieling, and S. Raunser. (* equal contribution)
Nature Structural and Molecular Biology, 2023
`https://doi.org/10.1038/s41594-023-01101-9`

Antibody accessibility determines location of spike surface mutations in SARS-CoV-2 variants
von Bülow, S., Sikora, M., Blanc, F.E.C., Covino, R., Hummer, G.
PLOS Computational Biology, 2023.
`https://doi.org/10.1371/journal.pcbi.1010822`

Computational epitope map of SARS-CoV-2 spike protein
Sikora, M.*, von Bülow, S.*, Blanc, F.E.C.*, Gecht, M.*, Covino, R.*, Hummer, G. (* equal contribution)
PLoS Computational Biology, 2021
`https://doi.org/10.1371/journal.pcbi.1008790`

An Asymmetric Mechanism in a Symmetric Molecular Machine
Florian Blanc, Marco Cecchini
Journal of Physical Chemistry Letters, 2021
`https://doi.org/10.1021/acs.jpclett.1c00404`

In situ structural analysis of SARS-CoV-2 spike reveals flexibility mediated by three hinges
Turoňová, B., Sikora, M., Schürmann, C., Hagen, W.J.H., Welsch, S., Blanc, F.E.C., von Bülow, S., Gecht, M., Bagola, K., Hörner, C., van Zandbergen, G., Landry, J., Trevisan Doimo de Azevedo N., Mosalaganti, S., Schwarz, A., Covino, R., Mühlebach, M.D., Hummer, G., Locker, J.K., Beck, M.
Science, 2020
`https://doi.org/10.1126/science.abd5223`

An intermediate along the recovery stroke of Myosin VI revealed by X-ray crystallography and molecular dynamics
Florian Blanc, Tatiana Isabet, Hannah Benisty, H. Lee Sweeney, Marco Cecchini, Anne Houdusse
PNAS, 2018
`https://doi.org/10.1073/pnas.1711512115`

Myosin MyTH4-FERM structures highlight important principles of convergent evolution
Vicente José Planelles-Herrero, Florian Blanc, Serena Sirigu, Helena Sirkia, Jeffrey Clause, Yannick Sourigues, Daniel O. Johnsrud, Béatrice Amigues, Marco Cecchini, Susan P. Gilbert, Anne Houdusse, and Margaret A. Titus
PNAS, 2016
`https://doi.org/10.1073/pnas.1600736113`

The myosin X motor is optimized for movement on actin bundles
Virginie Ropars*, Zhaohui Yang*, Tatiana Isabet*, Florian Blanc, Kaifeng Zhou, Tianming Lin, Xiaoyan Liu, Pascale Hissier, Frédéric Samazan, Béatrice Amigues, Eric D. Yang, Hyokeun Park, Olena Pylypenko, Marco Cecchini, Charles Sindelar, H. Lee Sweeney and Anne Houdusse
Nature Communications, 2016
`https://doi.org/10.1038/ncomms12456`