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Biophysicist researcher



Keywords : Single molecule approaches, Kinetic Monte-Carlo simulation, statistical physics, DNA polymer dynamics, soft matter, 3D genome conformation, circadian rhythm, ChipSeq & RNASeq analysis

SKILLS

Modeling

Approach : Kinetic Monte-Carlo simulation (C, C++)

Data analyses procedure

Developing an computing procedure to check the physical coherence (symmetry factor, correlation function) of gigabites of raw data and to applied first step of analyses

Genome-wide Analysis

Analysing ChipSeq and RNASeq data (pipeline process , BWT, algorithms, peakcaller software) to extract cycling pattern in a circadian system context

Informatics

Softwares : Mathematica, Matlab, Labview, Scribus (PAO)

Languages : C, C++,R, Fortran, bash script, Geany (IDE)

Tools : GIMP, Inkscape, Pymol, gnuplot

Office tools: OpenOffice and Microsoft office, LaTeX, Beamer

Systems : Linux (Ubuntu), Windows

Microscopy

Techniques : STM, MEB, fluorescence and dark field microscopy

Analysis : ImageJ

Characterization technique

DLS, Zetasizer, UV spectroscopy, quantification PCR

Visualization software

Chimeria, IGV, IGB

Surface treatment process

Chemical treatment : epoxydation, thiolisation, piranha

Physical treatment : Plasma cleaner, UV ozone

Method : spin coating, deposit convective self-assembly

Languages

English : TOEIC Score 775 (in 2014)

German : Conversational basics

TRAINING AND DIPLOMAS

2016-Now	Post-Doc in BioPhysics, BioInformatics Team : Collas Philippe (http://collaslab.org) Lamina-associated domains as tuning actors configuring the mechanical constraints of the chromatin domain at nuclear periphery in a circadian system context <ul style="list-style-type: none">Establishing how lamina-associated domains could modulate mechanical constraints and physical properties on the chromatin fiber and dynamically contribute of the regulation of these regionsPerforming a kinetic Monte-Carlo Simulations based on a mesoscopic statistical model of chromatinAnalyzing genome wide RNASeq and ChiPSeq data to investigate how expression pattern of metabolic genes is relates to changes in LAD recruitment (cancerous, circadian context)Improving a computational procedure for the analysis of the large RNA and ChipSeq data	University of Oslo (Norway) Ins. Of Basic Medical Science,Oslo
2012-2015	PhD in BioPhysics Specialty : Physics (3 years) Single molecule study of DNA molecules conformations with local defects or under a large set of physicochemical conditions - Advisor : Destainville N. (LPT) and Tardin C. (IPBS) <ul style="list-style-type: none">Measuring the impact of intrinsic bending, local denaturation or variation of ion concentration in solution on the DNA conformations with high-throughput Tethered Particle Motion (HT-TPM)Performing a kinetic Monte-Carlo Simulations based on a mesoscopic statistical model of DNADeveloping a computational procedure for the analysis of the large data sets from HT-TPM	University of Toulouse III (France) LPT and IPBS, CNRS, Toulouse
2011-2012	Master 2Research, Specialty : Nanosciences, Nanomesures Master's training period in nanotechnologies (6 months) Formation of nano-energetic material made of Al/CuO alloy driven by DNA auto-assembly and chip integration – Advisor : Bancaud A. and Rossi C. <ul style="list-style-type: none">Constructing heterogeneous advanced material structured on 1D, 2D or 3D by using the complementarity of the double strand DNA, and optimize its stability and its energetic response	University of Toulouse III (France) LAAS-CNRS, Toulouse (France)
2010-2011	Master 1, Specialty : Fundamental Physics Master's training period in microscopy (2 months) Studies of the 2-(3-perylene) ethanoic acid molecular by Scanning Tunneling Microscopy (STM) at Low Temperature and Ultra High Vacuum – Advisor : Coratger R. <ul style="list-style-type: none">Measure the value of the single negative charge appearing during the process	University of Toulouse III (France) CEMES-CNRS, Toulouse (France)
2009-2010	Licence 3, Specialty : Physics and Applications Training period at the Braley company Realization of a solar furnace coupled with a Stirling engine <ul style="list-style-type: none">Realizing the solar furnace and animating a stand on the energies at the open day of the company	University of Toulouse III (France) Braley Company, Bozouls (France)

GRANTS, AWARDS AND FUNDING

2016-2019 Grant of Marie Curie action : Scientia Fellowship, University of Oslo, Faculty of Medicine

SCIENTIFIC PUBLICATIONS

- In preparation **Brunet, A.**, Collas P., **Do lamina-associated domains(LADs) are an tuning actors for configuring physical and mechanical constraints of the chromatin domain at nuclear periphery ?**
- 2019 **Brunet, A.**, Forsberg, F., Fan Q., Sæther T., Collas P., **Nuclear Lamin B1 Interactions with Chromatin during the Circadian Cycle Are Uncoupled from Periodic Gene Expression**, *Frontiers in Genetics*, DOI: XX/YY
- 2019 Manghi, M., **Brunet, A.**, Destainville, N., **Statistical physics and mesoscopic modeling to interpret tethered particle motion experiments**, *Methods*, DOI: 10.1016/j.ymeth.2019.07.006
- 2019 Collas, P., Ali, T. M. L., **Brunet, A.**, Germier, T., **Finding Friends in the Crowd: Three-Dimensional Cliques of Topological Genomic Domains**, *Frontiers in Genetics*, DOI: 10.3389/fgene.2019.00602
- 2019 Forsberg F., **Brunet A.**, Liyakat Ali T. M., and Collas P., **Interplay of lamin A and lamin B LADs on the radial positioning of chromatin**, *Nucleus*, 2019, DOI: 10.1080/19491034.2019.1570810
- 2017 **Brunet, A.**, Salomé, L., S., Rousseau, P., Destainville, N., Manghi, M., Tardin, C., **How does temperature impact the conformation of single DNA molecules below melting temperature?** *Nucleic acids research*, 2017, DOI : 10.1093/nar/gkx1285
- 2015 **Brunet, A.**, Tardin, C., Salomé, L., Rousseau, P., Destainville, N., Manghi, M., **Dependence of DNA persistence length on ionic strength of solutions with monovalent and divalent salts: a joint theory-experiment study**, *Macromolecule*, 2015, DOI : 10.1021/acs.macromol.5b00735
- 2015 **Brunet, A.**, Chevalier, S., Destainville, N., Manghi, M., Rousseau, P., Salhi, M., Salomé, L., Tardin, C., **Probing a label-free local bend in DNA by single molecule tethered particle motion**, *Nucleic acids research*, 2015, DOI : 10.1093/nar/gkv201

CONGRESSES AND THEMATIC SCHOOLS

Oral Communications

- August 2019 Gordon Research Conference : Genome Architecture in Cell Fate and Disease – **Hong Kong**
- March 2018 Keystone Symposia : Chromatin Architecture and Chromosome Organization & Gene Control in Development and Disease – **Whistler (Canada)**
- October 2015 1st meeting of nuclear organization modeling and its pathologies – **Millau (France)**
- November 2014 3rd meeting of FRBT – **Toulouse (France)**
- May 2013 3rd edition of the “Les Houches School” in computational physics: DNA, from molecules to evolution – **Les Houches (France)**

Thematic Schools and Conference

- June 2016 Conference on Genome Architecture in Space & Time - **Trieste (Italy)**, (1 week)
- August 2014 Summer school : SOFT-FIRE-2014 – **Cargèse (France)**, (2 weeks)
- May 2013 3rd edition of the “Les Houches School” in computational physics: DNA, from molecules to evolution – **Les Houches (France)**, (2 weeks)

Poster Communications

- August 2019 Gordon Research Conference : Genome Architecture in Cell Fate and Disease – Hong Kong
- March 2018 Keystone Symposia : Chromatin Architecture and Chromosome Organization & Gene Control in Development and Disease – Whistler (Canada)
- 9 May 2017 Oslo Epigenetics Mini Symposium - **Oslo (Norway)**
- 8-14 August 2015 Gordon Research Conference (GRC) : Soft Condensed Matter Physics - **New London (USA)**
- August 2014 Summer school : SOFT-FIRE-2014 – **Cargèse (France)**
- May 2013 GDR Cell Tiss 2013 - **Lyon (France)**
- May 2013 3rd edition of the “Les Houches School” in computational physics: DNA, from molecules to evolution – **Les Houches (France)**

Seminars

- October 2018 Seminaire IPBS - **Toulouse (France)**
- August 2014 Gordon Research Seminar (GRS) : Soft Condensed Matter Physics - **New London (USA)**
- January 2014 Seminaire IRSAMC - **Toulouse (France)**

STUDENT SUPERVISION

PhD co-supervision

- Oct 2018-Now Tharvesh M. Liyakat Ali : **Analysis of the 3D genome**
- April 2018-Now Frida Forsberg : **Chromatin-nuclear lamins interactions modulated by external cues**

Master's training period

- Summer 2014 (2months) Juliette Wilhem : **Probing the experimental effect of the ionic strength on the DNA conformation release by TPM, at the single molecule level**

REFERENCES

Pr. Destainville Nicolas

Laboratoire de Physique Théorique,
Group : Physique Statistique des Systèmes Complexes
Toulouse, France

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Dr. Bancaud Aurélien

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Paris, France

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OTHER ACTIVITIES AND INTERESTS

Other professional experience

2012 Technical staff at the Symposium J of l'E-MRS 2012 Spring Meeting - Strasbourg (France)

Associative activities :

Since 2009 Co-founder and editor of the inter-university newspaper : *Le Lapin Blanc* – University of Toulouse I, II and III (France)

2007-2008 University of Toulouse III site organizer for the AMIDONS association – Inter- university Association for donation of blood – University of Toulouse III (France)

Since 2006 AMIDONS association volunteer - Toulouse (France)

2003 First aid qualification - *Attestation de Formation aux Premiers Secours* - Œuvre hospitalière française de l'ordre de Malte (France)

Entertainment : Reading (Polar, Heroic fantasy, Anticipation), climbing, volleyball, badminton, cinema, theater, rugby