



PhD THESIS OFFER

A 3-year contract is offered to carry out a **doctoral thesis** in the “**Structural Disorder and Molecular Recognition**” team under the supervision of **Sonia Longhi** at the **AFMB** lab, Marseille, France.

The thesis is framed within the project

INTRINSICALLY DISORDERED REGIONS IN HOX PROTEINS: UNRAVELLING THEIR ROLE IN CONFORMATIONAL CHANGES, LIQUID-LIQUID PHASE SEPARATION AND GENE TRANSCRIPTIONAL REGULATION DURING DEVELOPMENT

Funding: [Amidex](#)

Net salary: 1600 € /month

Collaboration: Yacine Graba (IBDM), Marseille (<https://www.ibdm.univ-amu.fr/team/mechanisms-of-gene-regulation-by-transcription-factors/>)

Key words: Development, Transcription, Hox proteins, gene regulation, intrinsically disordered regions (IDRs), Homeodomain, *Drosophila*, liquid-liquid phase separation, conformational heterogeneity, small-angle X-ray scattering, biophysics, protein modeling and conformational ensembles, developmental and molecular genetics, transcription, gene regulation

Summary. Gene regulation is achieved by transcription factors (TFs) whose functional specificities often are poorly understood. Based on recent findings from our and other teams, we hypothesize that TF nuclear sub-compartmentalization achieved through Liquid-Liquid Phase Separation (LLPS) and driven by protein Intrinsic Disordered Regions (IDRs) is key to transcriptional specificity. The PhD project will aim at using the *Drosophila* Ultrabithorax (Ubx) Hox TF, a member of a large TF family that specifies the diversity of animal body plans during development and evolution, to decipher how IDRs control LLPS and study the role of LLPS in TF activity and specificity. Work will combine biophysical/computational approaches with modern *Drosophila* molecular genetics to establish a continuum from the biophysics of the protein towards its in vivo transcriptional activity.

RESEARCH ACTIVITIES: The PhD student will be in charge of producing in *E. coli* wild type and mutant forms of Ubx proteins. He/she will then use these purified Ubx proteins to assess their conformational properties (using limited proteolysis, far-UV circular dichroism, analytical size-exclusion chromatography, and small-angle X-ray scattering) and their ability to undergo LLPS.

REQUIREMENTS: Candidates should have a competitive academic record and a strong motivation for studying IDRs and LLPS processes, and should have completed an Official Master degree in Biochemistry, Molecular Biology, Biophysics, or related fields.

HOW TO APPLY: Interested candidates can submit their academic transcripts, curriculum vitae, and a cover letter as soon as possible to the email address: sonia.longhi@univ-amu.fr. The application period will begin in August 2023 and the contract is expected to start on January or February the 1st, 2024 (subject to the administrative timelines established by Amidex and Aix Marseille University).