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CENTRO NACIONAL DE BIOTECNOLOGÍA

CENTRO NACIONAL DE BIOTECNOLOGÍA (CNB)  
Dept. of Macromolecular Structures  
The Moreno-Herrero Lab  
*Molecular Biophysics of DNA repair nanomachines*

Madrid, September 4, 2024

## **JOB OFFER: Predoctoral (PhD) contract**

Centro Nacional de Biotecnología  
Dept. of Macromolecular Structures

### **PROJECT TITLE:**

Understanding DNA-end Processing and Joining using Single-Molecule Biophysical Methods

### **PROJECT SUMMARY:**

A remarkable set of protein machines safeguards the integrity of our genome, continuously under threat from various factors. Central to DNA repair and maintenance are the homologous recombination (HR) and non-homologous end-joining (NHEJ) pathways, which are composed of a series of sequential processes aimed to repair potential DNA damage. In this project, we will focus on two critical processes within these pathways: the processing of DNA ends in HR and the role of lncRNAs in the NHEJ pathway. Our work will be centred around two sets of proteins, CtIP and MRN, and Ku and lncRNAs. The human DNA repair factor CtIP helps to initiate the resection of double-stranded DNA breaks for repair by HR. It works together with the MRN complex. However, the molecular mechanisms governing CtIP's function remains unknown, mainly due to its intrinsically disordered structure. Ku is a heterodimer formed by Ku70 and Ku80 subunits, and recent studies have shown that it interacts with specific long non-coding RNAs, enhancing the efficiency of DNA end joining. We will investigate how these proteins participate in the process of DNA repair using the arsenal of single molecule methods developed and available in our group. Furthermore, our research extends to the development of instruments and methods, particularly to a combined AFM-TIRF microscope that we aim to push to state-of-the-art technology.

### **TRAINING PROGRAM:**

Training activities include regular seminars at the Macromolecular Structures Dept. (CNB), seminars at the network of Mechanobiology (within the context of a collaborative project funded by Madrid Community), lectures from the PhD program in Molecular Biosciences, or the PhD Program in Condensed Matter Physics and Biological Systems at the Universidad Autónoma de Madrid (UAM), where the PhD students of the group are enrolled; and participation in national and international conferences. Additionally, the CNB provides its own PhD student training program dedicated to promoting the career development of future generations of researchers. This program includes lectures and workshops on topics such as "How to write a scientific paper," "Ethics and Integrity in Research," and "How to plan, structure, design and give scientific talks".

### **CONTRACT DURATION:**

4 years

### **REQUIREMENTS, EXPERIENCE AND ACADEMIC QUALIFICATIONS:**

- Bachelor's degree in Biology, Physics, Biophysics, or related fields.
- Good Academic record for the Bachelor's and Master's degree.
- Master's studies completed by September 2024
- High motivation for scientific research.
- Proficiency in English.

C/ DARWIN, 3  
28049 MADRID  
ESPAÑA  
TEL.: 91 585 4500



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**APPLICATION INFORMATION:**

Send an email to [fernando.moreno@cnb.csic.es](mailto:fernando.moreno@cnb.csic.es) including:

- Curriculum Vitae.
- Academic Transcript with grades and GPA from the Bachelor's and Master's degrees.
- 2 reference contacts.

**CONTACT:**

*Prof. Fernando Moreno-Herrero*

Molecular Biophysics of DNA Repair Nanomachines

Centro Nacional de Biotecnología (CNB-CSIC), Campus UAM, Madrid

[fernando.moreno@cnb.csic.es](mailto:fernando.moreno@cnb.csic.es)

[www.fernandomorenoherrero.com](http://www.fernandomorenoherrero.com)