2023-2024 TFM projects at the Moreno-Herrero Group
National Center of Biotechnology (CNB-CSIC). UAM campus, Madrid

Single molecule approaches to study DNA repair by DNA-end processing and joining

Double-strand breaks (DSBs) arise spontaneously due to replicative stress in all dividing cells, but can also be induced by exposure to ionizing radiation or chemotherapeutic agents. Timely and faithful repair of DSBs is imperative for the maintenance of genome integrity as failure to do so leads to mutagenesis or the loss of genetic information. The homologous recombination is a key pathway for DNA repair. It is intrinsically complex and involves a multitude of proteins and several perfectly synchronized stages. In this project, we will focus on the activity of protein factors involved in the stages of DNA recognition and short-range resection. We will setup single molecule assays based on magnetic tweezers, AFM and fluorescence techniques to assess the DNA bridging ability of CtIP and how this is potentially modulated by the MRN complex. We will investigate if CtIP can specifically join two DNA-end and/or diffuse along the DNA molecule. The project requires some background in physics and data managing and analysis. This project constitutes the basis of a more extensive endeavour intended to be expanded upon during PhD studies, with the possibility of securing funding through an FPI fellowship in late 2024.

Group: Molecular Biophysics of DNA repair nanomachines
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