

HALRIC Research Internship Programme

Internship Proposal

Project Title: Understanding Histone Dynamics through Electric Field Perturbations

Name of Institution/Country: University of Hamburg, Germany

Name of internship provider: Dr. Maggie Klureza (Postdoc), Prof. Arwen Pearson (PI/Group leader)

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Proposed timeframe: June 2 – August 15, September 1 – December 5, or another (2-4 month) timeframe by mutual agreement.

Application deadline: May 20 if a June 2 start is desired; otherwise, June 30.

Administrative contact person at the organisation: Elena Kornilova

Scientific research questions

This project focuses on understanding how histone motions within nucleosome core particles contribute to nucleosomal dynamics and, ultimately, epigenetic information encoding.

Experimental approach

The primary focus of this internship is large-scale histone expression and purification. This work will involve a range of biochemical techniques, including cell culture, recombinant protein expression, cell lysis and protein extraction, ion exchange chromatography, and gel electrophoresis. However, the aim of the larger project is to investigate histone biophysics using electric field-stimulated X-ray crystallography (EF-X), a time-resolved crystallographic technique. Accordingly, if desired, the intern can also contribute to EF-X method development by taking part in X-ray beamtime at the PETRA III synchrotron.

Tasks of the intern

- Protein expression (Established protocols in the lab)
- Protein purification (Established literature methods; first implementation in the lab)
- X-ray crystallography data collection (Specialized techniques with full training provided)
- Full participation in daily life of the Pearson lab (Attendance at lab meetings, contribution to preparation of communal reagents, etc.)

General information about the work group, the university and the region

The Pearson group focuses on understanding the behavior and properties of biological macromolecules using a wide range of biophysical techniques – and sometimes inventing new ones as needed! The lab is located in HARBOR (Hamburg Advanced Research Building for Bioorganic Chemistry), a center for interdisciplinary research located on the Science Campus Hamburg Bahrenfeld. This location provides access to resources and opportunities through not only UHH, but also DESY, the Max Planck Institute for the Structure and Dynamics of Matter, EMBL Hamburg, and more.

Eligibility and qualification of the applicant.

We are looking for a MSc/BSc student in biophysics, structural biology, or biochemistry to join this project. However, both the nucleosome EF-X project and the Pearson group more broadly are highly interdisciplinary, and we value the experience and insight that can come from a range of prior backgrounds. If your degree is in another field but you feel that you would be a good fit for this project, please apply!

Prior wet lab experience is highly desirable; prior experience with protein expression or purification is advantageous but not required. Applicants should be comfortable working in English, as this is the primary language of the lab.