Student Research Project:
Mapping the Dynamic mRNA Interactome with HCR-Proxy

Are you a driven student fascinated by RNA biology, spatial proteomics, or molecular imaging? Do you want to work at the cutting edge of molecular biology and computational analysis across leading European research institutes?

Group of Prof. Dr. Miha Modic (https://modiclab.org/, Kemijski Inštitut & Carl Zeiss Center for Synthetic Genomics Heidelberg University & KIT) is offering an exciting **student research opportunity** (initially via ***studentska napotnica*** and later as part of **MSc thesis,** with possibility of employment as PhD student or expert fellow after the successful MSc defence) on a collaborative project that applies **HCR-Proxy**, our recently developed cutting-edge technique for mapping RNA-proximal proteomes at nanoscale resolution.

Project Overview: RNA molecules orchestrate the organization of subcellular compartments and condensates — but how do their interactions with proteins change as they transition across the cell?

To answer this, we developed HCR-Proxy, a novel proximity labeling method that combines Hybridization Chain Reaction (HCR) with in situ biotinylation (Proxy), enabling the identification of RNA-proximal proteins at nanoscale resolution. This project will apply HCR-Proxy to study mRNAs as they transit between nuclear and cytoplasmic compartments, revealing how RNA localization rewires local proteomes.

What You'll Do: You will work on an interdisciplinary project that links **Molecular biology** (Probe design, hybridization assays, RNA/protein isolation, immunoprecipitations), **Cell culture & engineering** (CRISPR and Flp-In design of new cell lines), **Biotin-based proteomics**: Proximity labeling, streptavidin pulldown, mass spectrometry and **Microscopy**: STED or confocal imaging. You will be able to get familiarized with modern approaches in **Computational biology** with our team (Protein feature extraction, interactome analysis, machine learning models)

Project Environment: You'll be embedded at the **National Institute of Chemistry** in Ljubljana, with opportunities to interact with researchers across all partner institutions, and in the case of a longer research stay also perform part of the research project at Carl Zeiss Center for Synthetic Genomics, KIT (Germany) and King's College London (UK)

Joint Supervision:
You will be primarily supervised by

- **Anja Trupej** (National Institute of Chemistry, Ljubljana) and co-supervised by
- **Miha Modic** (Carl Zeiss Center for Synthetic Genomics KIT and National Institute of Chemistry)
- **Flora Lee** (King's College London)

Who We're Looking For:

- **Master's student** in molecular biology, biochemistry, biotechnology, laboratory biomedicine, or a related field
- **Strong interest in RNA-protein interactions, cellular organization, or proteomics**
- **Initial experience with lab techniques** (PCR, RNA isolation, transfection, etc.)
- (Bonus) Skills in mass spectrometry, microscopy, or computational biology (Python, R)

To Apply: Please send the following application materials to anja.trupej@ki.si and miha.modic@ki.si:
- **1-page motivation letter**
- Your **CV**
- Contact details of **one research group** (the PI of the lab or your working mentor) where you previously worked

We are looking forward to hearing from you!