Title: Therapeutic and endogenous mRNAs metabolism.

Supervisor: Prof. Andrzej Dziembowski, PhD DSc. Institute: International Institute of Molecular and Cell Biology in Warsaw Laboratory: Laboratory of RNA Biology – ERA Chairs Group www: <u>https://shorturl.at/lyzS5</u>

## **Project description:**

mRNA vaccines proved to be a breakthrough in the fight against the COVID-19 pandemic, paving the way for broader medical applications of mRNA-based therapies.

However, there are still significant gaps in our understanding of mRNA metabolism at the organismal level, which limits the optimization and refinement of such therapies. Recently, our laboratory described an unexpected mechanism that significantly enhances the stability of therapeutic mRNAs (Krawczyk et al., *Nature*, 2025).

Currently, we are exploring strategies to improve mRNA stability, which will allow for an expansion of its medical applications. The stability of mRNA molecules is influenced by the length of the poly(A) tail, which in turn affects therapeutic efficacy. Data collected by our team revealed that the variability in poly(A) tail processing across different cell types is much greater than previously anticipated.

## Aim:

The exact focus of the PhD project will depend on the skills, background, and interests of the selected candidate. Potential research directions include:

- developing methodologies for direct RNA sequencing (including the use of neural network-based bioinformatic analysis tools, e.g., Gumińska et al., Nature Communications, 2025),
- analyzing mRNA stability in vivo using transgenic mouse models,
- Investigating mechanisms controlling mRNA stability and designing more efficient mRNA-based therapies.

## **Requirements:**

- Master's degree in bioinformatics, biology, biotechnology, biochemistry or related field
- Highly talented individuals who are passionate about research and are full of scientific curiosity
- Experience in either: bioinformatic analysis of transcriptomic data, molecular biology/transcriptomics, or animal models will be a clear benefit,
- Written and spoken fluency in English
- Willingness to learn and take on new challenges, ability to work independently, analytical thinking
- good interpersonal skills and a collaborative attitude

## Number of positions available: 2

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